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LISTERISM

PROPERLY AND IMPROPERLY APPLIED IN THE TREATMENT OF INFECTIONS OF BONES AND JOINTS*

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IN presenting my thoughts to you upon this subject I do so largely with the hope that the methods which I propose may be considered and improved upon in such a way that our specialty may become more useful, and that success in these difficult cases may become more general than could be possible without your interest and your help.

As matters stand in surgical practice at the present time, every doctor who puts a piece of soiled gauze wet with Dakin solution or any other antiseptic into an infected wound feels that he is practicing the sort of antiseptic surgery for which we are indebted to Sir Joseph Lister. In some degree we have all fallen into the same error. We dip our soiled hands or our instruments into weak antiseptic solutions, we lave our infected wounds with solutions that become inert in a moment, and we trust the germs somehow for hours following to curl up and lie dead. The kind of antiseptic surgery that is now practiced, especially that which has to do with infections of bones and joints, has too little resemblance to Listerism to deserve the name. It is mostly not as well done as in Lister's time

Aseptic surgery, the prevention of infectious surgical complications, has vastly improved in the perfection of its technical details since Lister showed us the way. Our methods of dealing with infected wounds, however, have not improved to the point that our knowledge should have carried us. We still have mixed infections, prolonged suppurations, delayed healing and permanent disability due to protracted infections that are preventable, unjustifiable, and to a large extent, a reproach to surgery.

In order to formulate the matters that I wish to discuss, I wish to submit the following general propositions:

1. Our results in acute and chronic infections of bones and joints fall short at present of what we have a right to expect in such cases.

2. Poor results in such cases are due to one of the following:

Failure to afford early and adequate drainage of the infected area.

Secondary and mixed infections.

Failure to protect the parts against harmful motion and preventable deformity.

3. Extension of the primary infection, mixed infection, secondary foci, delayed healing, deformity, and permanent disability may all be prevented or controlled to a large extent by a method to be described.

The attempt to improve our methods in dealing with infections is difficult because

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it has been generally supposed that our aseptic and antiseptic methods have already reached a high degree of perfection. Especially since the introduction of the Carrel-Dakin method, it has been assumed in many quarters that no better method of dealing with infected wounds could be hoped for. One must say that some of the demonstrations of this method have been very beautiful, but in general the attempts to use this and other forms of "active antisepsis" give results no better than, if as good, as those obtained by Lister with his carbolized beeswax dressings done "under the spray." It will surely have been your observation that osteomyelitis and compound fracture patients who come late to you for reconstructive surgery present great damage from infection and great disability from lack of enforcement of the principles of deformity prevention which are the fundamentals of orthopedic practice.

My point is this, that although the principles of asepsis (I shall not say antisepsis) are well known to us and although methods of immobilization in correct position are available to anyone, it is the exceptional surgeon only who observes and employs these principles and methods in dealing with his patients.

The treatment of wounds in general at the present time, in spite of our war experience, has not progressed very much beyond what was being done at the end of the last century. The efforts to provide rest in the best sense for injured parts has in a large measure given way before the supposed requirements of the antiseptic method for wound treatment.[1] Splinting for immobilization has yielded to any compromise that will permit the use of wet packs, irrigation, frequent changes of antiseptic dressing, etc. Neither the wound nor the injured part is thus given an opportunity for rest.

Some of our difficulties in treating infected wounds have arisen out of the fact that in discussing character of infection, number of organisms, selection of antiseptic, etc., we have lost sight of the general principles referred to. Consequently, even if rigid asepsis is observed at the time of operation in dealing with osteomyelitis or a compound fracture, it has become the universal custom to reinfect these patients daily or twice daily by what we are pleased to call antiseptic dressings—which never are antiseptic. Moreover, in our enthusiasm for these more complicated kinds of antiseptics, we not only disturb the wound surface and add to the bacterial flora but we disturb the entire area and even go so far as to forbid protective casts and splints. Also we add further injury to the patient by leaving irritating chemicals in contact with the wound surface in an attempt to destroy in the wound by direct antisepsis infection that should not have been permitted to be there. The result of all this is failure to prevent deformity, profuse discharge, unnecessary suffering and delayed healing unless the patient has a high degree of resistance to irritation and infection and recovers in spite of it.

Following the lead of Lister, our ideal has always been to secure healing of the wounds without the appearance of a purulent discharge. The cleanliness of the wound has been one of the great factors in the popularization of the Carrel-Dakin method. I have become convinced, however, that in many cases the fact of a moderate amount of discharge, even if

[1] "The treatment of a compound fracture must be divided into two parts: (a) the cleansing of the wound and (b) the setting or reduction of the fracture, followed by its maintenance in good position. In the early stages the first is by far the most important, and on its attainment depends, within limits, the success of the second.

Total immediate reduction is good and is to be aimed at provided it can be carried out without prejudice to the cleansing of the wound but an incomplete reduction, or even no reduction at all, may be advantageous by aiding the disinfection of the wound. Surgeons working at the front are therefore mainly concerned with the primary cleaning of the wound and with the means to transport a patient to the base with comfort and without detriment to the wounded limb." (Bowlby, A. A., and Wallace, C. Abstract of war surgery. *Brit. M. J.*, 1917, p. 44.)

purulent in character, is of much less moment to the patient and to the healing of his wound than protection against motion and irritation of the injured part, reinfection by exposure for frequent dressings, and loss of position in a part where there is a tendency toward deformity. I have permitted a discharge quite profuse in character to be in contact with a wound for several weeks and found good progress in healing during the whole time.

The whole matter of frequent wound dressings is very thoroughly disposed of by Sir Almroth Wright in his book on "Wound Infections."[1] It is there very clearly pointed out that the frequent redressing of wounds is quite inadequate and unreasonable and that finally the application of antiseptics quite frequently does harm rather than good. The harmful effects pointed out by Sir Almroth, however, are chiefly physiological as related to the wound and the immediate wound area and have to do with the granulations, the movements of the leucocytes and microbial growth.

If so little is accomplished for the wound itself by the application of antiseptics, certainly it seems highly unreasonable to inflict such dressings upon the patient in view of the other disadvantages that have to do with the hematogenous distribution of infection—muscle spasm, pain, deformity, etc. These violations of general as well as local rules involve the neglect or violation of orthopedic principles of treatment for injured or inflamed parts at the same time.

In Wright's advocacy of wound treatment by physiological methods (page 64) physiological considerations chiefly in connection with wound treatment are put forward. At the same time free incision and dispensing with sutures as well as the application of physiological solutions are urged. Unfortunately, no provision is made for physiological rest for the wound or for the part such as we as orthopedic surgeons consider to be necessary. With his treatment by vaccine therapy I do not feel competent to deal. I am constrained to remark, however, that fortification of the patient against infection by specific antitoxins has been fully demonstrated to be good treatment. If specific antitoxins can be developed for all the germs that cause our numerous septicemias, we shall be extremely fortunate. At the present time these are certainly not reliable to any considerable extent.

When Sir Joseph Lister proposed the antiseptic method for the treatment of infections, surgery as a profession as well as surgical patients were in great difficulties. Septic fever, hospital gangrene and pus were the expected accompaniment or sequel of every injury and every surgical procedure. Through the influence of Lister all that has been changed. Primary healing of wounds after aseptic operations may be expected with certainty if the rules of asepsis and antisepsis are observed.

Lister not only thought out but also worked out methods for the prevention of infection. If there may be said to be a weakness in the antiseptic system which developed either in Lister's time or since, it is in the fact that in proceding from the prevention of infection to the control of infection there has been lost the strict observance of the rules which Lister himself laid down. Every one will admit that we still have entirely too many operative and postoperative infections. I think we must admit also that these infections are due to failure to prevent either primary or accidental secondary infection. Moreover, additional industry in antiseptic research, that is to say, the trying out of new antiseptics and more and more complicated dressings, has added to the irritation of wounds and to the disturbance of parts until it is high time that we should make a plea for rest for the wound and for the injured part rather than for additional varieties of disturbance.

We must admit that in general a high

[1] Wright, A. E. Wound Infections. N. Y., Wm. Wood & Co., 1915. p. 49 et seq.

degree of success in the prevention of infections in operations upon the abdomen and upon the soft parts has been attained. The number of infections in bone and joint operations, both primary and secondary, has been entirely too high and we must all feel that it is necessary for us to improve our methods if we are to make progress in this special field of surgery.

Listerism, as applied to the performance of aseptic operations, has been perfected and improved to a remarkable degree. But Listerism, as applied to the treatment of infected wounds in general practice is scarcely as good as in the days of Lister himself. It must always be remembered that Lister conceived of antisepsis as a means of preventing rather than controlling putrefaction. In his own words, "it is hardly needful to point out that neither the spray nor the carbolic oil applied externally nor the oiled lint inserted in the outlet to serve as a drain could correct putrefactive fermentation once established in the abscess cavity. Here, as in the antiseptic treatment generally, the means are calculated to prevent, not to correct, putrefaction."[1]

Lister says further: "If we treat our wounds by means expressly calculated to exclude altogether the entrance into them from the first to last of minute organisms, not only are the specific diseases got rid of, not only do hospital gangrene and pyaemia, those scourges of former surgery, fly away as at the touch of the enchanters wand to trouble us no more forever, while septicemia also vanishes, and erysipelas, though more stubborn, is robbed of its terrors—not only, I say, do these diseases, recognized as specific, disappear, but, if the treatment is properly conducted, we get rid of inflammation altogether; and we see wounds that are left with their edges widely gaping, and become occupied with a substantial blood clot, heal, it may be, without a particle of pus, a cicatrix forming beneath the superficial layers of coagulum.

"The times of changing the outer cloth, or treating it with fresh oil, should be in accordance with the amount of discharge. During the first twenty-four hours the effusion of blood and serum is necessarily profuse, and it will be well that fresh oil be applied to the outer cloth within twelve hours of the first dressing or even in six hours if there should be unusual oozing. On the second day, also in the case of a large wound, two dressings in the twenty-four hours will be desirable. After this, if all goes well, the discharge will diminish quickly, and a daily renewal of the antiseptic supply will be sufficient; and when five or six days have passed, to apply the oil once in two days will be all that will be required. This, however, should be continued after discharge has ceased entirely, till sufficient time has passed to insure that the wound has healed by scabbing, or at least has been converted into a superficial sore."[1]

Although Lister investigated many substances, he did not find any so generally used as carbolic acid, until after the publication of Koch's work on antiseptics in 1881 he was led to examine the salts of mercury. He found that some of these were, under certain circumstances, as useful and much less irritating than carbolic acid, and that being the case he restricted the use of carbolic acid greatly.

"In arguing in favour of the meticulous care that Lister took to avoid sepsis, and of the theoretical basis of the treatment on which Lister's method was founded, one used often to be met with the statement that healing without suppuration or septic disease was no new thing, and that therefore Lister's views could not be accurate. Some asserted that any increased success which Lister obtained was essentially the result of increased simple cleanliness (apart from disinfection) that Lister's method entailed, and as time went on those surgeons who were particularly careful as to cleanliness were able to bring forward very striking results in

[1] Collected Writings of Lord Lister. N. Y., Oxford Univ. Press, 1909, i, 400.

[1] *Ibid.*, ii, 161, 162, 163, 227.

favour of this view. And there is no doubt that there is much truth at the bottom of this contention. For even simple cleanliness (and by that I mean simply washing with soap and water) means a very great advance over the state of matters which prevailed before the Listerian period."[1]

Reduced to its simplest terms, Lister's teaching was that by the use of antiseptics infection could be excluded from surgical or accidental wounds. In a surgical wound, this may and should mean, the exclusion of all infection. Lister has certainly taught us that we may exclude from a wound infected from any cause additional infection of the same kind or new infection of a different kind. For the large majority of patients this would mean an uncomplicated recovery. But this teaching has usually not been observed. Such methods of wound treatment as salt packs, the La Porte method, the Carrel-Dakin method, etc., which have gained popularity for one reason or another, are nearly all open to the objection that they interfere with such protection of the wound and adequate immobilization of the damaged parts in correct position. It is the opinion of the author that the two points to be kept constantly in mind in connection with these cases are protection of the wound and immobilization of the parts. This is with the understanding, of course, that primary drainage and cleaning up of the wound have been adequate and satisfactory. Secondary abscess in bone and joint infection is due either to direct inoculation of the skin at places remote from the primary lesion or to hematogenous transmission of material from the original infection. Secondary infections in the manner first mentioned should not, of course, occur. Secondary infections by hematogenous transmission of organisms from the original focus may be prevented much more often than we realize if the wound surface is let alone and if the inflamed area is adequately immobilized during the inflammatory period.

The exact technique which has been worked out to comply with the requirements proposed is as follows:

1. Make a fairly large incision over the infected bone area. Spread apart the skin, muscles, fasciae and periosteum just far enough to afford access to the diseased area and no farther.

2. Chisel a window into the infected bone area large enough so that adequate drainage is provided and that all dead bone may be removed and so that there are no overhanging edges of bone over the diseased area.

3. Clean out the diseased area gently with a curette or gouge, being careful to refrain from unnecessarily damaging the tissues undergoing repair.

4. Dry the wound and wipe out with 10 per cent iodin followed by 95 per cent alcohol.

5. Pack the entire wound wide open but not tightly with a sterile petrolatum gauze pack. Cover this with a dry sterile pad and bandage on.

6. Now perform any reasonable forcible manipulation necessary to place the parts in correct anatomic position for splinting.

7. Apply a plaster cast, preferably, or a suitable splint so that the parts are thoroughly immobilized in comfortable and correct position.

8. Finally the cast is not to be split nor are windows to be cut until the wound dressing becomes necessary. And the *wound is not to be dressed* at all unless there is a rise of temperature or other signs of acute sepsis. As a rule, no dressing is necessary except on account of odor and this may not be required for several weeks. In a majority of cases the patient treated by this method will go through to complete healing with a few dressings at intervals of from ten days to four weeks.

It is to be noted that the great improvement in the treatment of wounds during the great war was coincident with and

[1] Cheyne, W. W. Lister and His Achievement. London, Longmans, 1925, p. 100.

consequent upon the improvement in the early splinting and more careful transportation of the wounded. With the organization of splint teams at the front and the more careful handling of the wounded from the moment of injury, the care of wounds became a much simpler matter and recovery was much more rapid than formerly. It was the unanimous opinion of those who were in a position to observe the effect of prompt splinting on these patients that the amount of shock was greatly reduced, that many lives were saved entirely as a result of these prompt methods of splinting and that wounds were in much better condition for the same reason.

One of the most interesting applications of the treatment of infected bone wounds by rest is to be found in compound injuries and osteomyelitis of the tarsus and adjacent portions of the foot and ankle. One of the first cases of osteomyelitis treated by Lister by the antiseptic method was one of the tarsus. The foot healed in a most gratifying manner and afforded a striking contrast to the results in similar proceding cases. In this class of cases even now amputation or severe disability has been the rule because of the extensive incisions that are commonly made in an effort to establish drainage of the foot, ankle and leg, the attempts to combat infection by wet antiseptic dressings and the failure to apply mechanical devices for the maintenance of correct position of the foot and leg.

Some of my own most gratifying results obtained by the application of the principles of rest to wounds and infections of this sort have also been obtained in the foot. Adequate drainage in any stage of compound or infected fractures with the foot maintained in correct position in plaster has given the most gratifying results. In this way healing in correct position in a very short time can be obtained and, although there is a certain amount of bone deformity, the patients have been found to have useful and painless extremities. The following is an illustrative case:[1]

Miss E, nurse, aged twenty-one, developed an acute inflammatory condition in the left foot in January, 1923. The foot was immediately incised but local and general sepsis progressed. Further incisions were made in all parts of the foot and leg following the tendon sheaths and fascial compartments, as is customary in such cases.

I saw her at the end of the seventh week. She was in a serious condition with an enormously swollen leg which had been freely incised and continuously fomented or irrigated for weeks. She had marked hip, knee and ankle contracture. The foot and leg were badly macerated and very foul because she would not tolerate any cleaning up measures. Roentgenogram at this time showed a destructive bone lesion involving the tarsus which had apparently never been drained. (It may be mentioned that at this time the pain was so severe that she was receiving ¼ grain of morphine every four hours.) Upon my advice she was taken to the operating room and a thorough drainage operation into the tarsus was done. A good sized abscess was found and cleaned out. The wound was packed well open with vaselin gauze and then the hip and knee were straightened out. With a little force the foot was brought up to a right angle with the leg. All of the other open incisions were merely wiped off (or out) with iodin and rinsed with alcohol. A sterile sheet cotton bandage was put on over the gauze dressing and a long cast was put on. The patient was put to bed with the leg in suspension and traction. For the first day or two she still clamored for morphine but received none after the third day. At the urgent request of her previous surgeon I did a dressing on the tenth day. There was no discharge and the wound looked healthy. None of the other incisions gave the slightest trouble. This patient was in the cast for about three months. Then a posterior iron was put on. The wound was entirely healed and remained so. There is a little equinus and varus deformity but with a special shoe no disability whatever. For the past two and one-half years she reports that she is able to do as much on her feet as she ever did.

[1] Previously reported. Orr, H. W. Treatment of osteomyelitis and other infected wounds by drainage and rest. *Surg., Gynec. & Obst.*, 1927, xlv, 446.

In considering methods of primary and secondary closure of septic wounds, one important point has sometimes been overlooked; that is, that even in wounds that are apparently quite clean and in which cultures indicate a great decrease of the number of organisms, there are still pockets of infection deep in the tissue, the condition of which is not shown by the cultures taken from the surface. When these pockets are covered up, subsequent irritation is likely to cause a renewed activity at the point of these small septic pockets. Indeed, it has been quite common for such cases, closed after thorough Dakin treatment, to break down and give new trouble.[1]

Even if such a method as the Carrel-Dakin were adequate for the treatment of infections of bones and joints, and if the use of splints were unimportant, and plaster casts could be dispensed with, I should still consider it too difficult a technique for general employment.[2] The highly complicated methods that can be employed by competent surgeons will not do for recommendation to the profession at large. There is sufficient evidence of this even in the matter of the performance of simple aseptic procedures in which unfortunately too many failures still occur. It is certainly to be considered, therefore, that any method which simplifies the care of infected wounds and which requires the keeping off of hands and instruments on many occasions has much to recommend it. If, as I have suggested, a compound injury to a bone or joint may be cleaned up once and then let alone for weeks, the patient's chance for escaping secondary and chronic infections has certainly been improved.

There is at times some misunderstanding as to just what it is that makes the method that I propose different from others that have long been employed. Some have thought that I advocate a new type of operation, others that I consider the use of vaselin plugs to be original, and still others that I claim to be the first to employ infrequent dressings. None of these suppositions is correct. A combination of measures is considered to be essential to successful treatment of these cases. These measures are as follows: (a) adequate drainage, (b) primary aspesis or antisepsis, (c) a non-absorbent, non-irritating dressing which will exclude infection from the wound, (d) avoidance of secondary infection by unnecessary dressings and (e) immobilization in correct position during the entire period of healing.

It is necessary in considering the method that I propose to consider it and to employ it as a whole. It is not sufficient to

[1] "In four cases last year Dr. Dandy, our resident surgeon, irrigated for from twenty-five to thirty days with the Dakin solution according to the Carrel method, the properly prepared involucral cavities, and then, the microorganisms having been reduced for six or more days to about 1 in 10 fields (the counts were made by Dr. Lawrence), the soft parts were trimmed and the wounds closed. For about six weeks in one case, eight weeks in two cases, and three weeks in a fourth, the wounds remained closed and without evidence of revivement of the bacteria. Then the tissues became slightly inflammed and the wounds opened." (Halstead, W. S., in Keen's Treatment of War Wounds. Ed. 2. Phila., W. B. Saunders Co., 1918, p. 255.)

[2] "In spite of its immense value, four valid objections to the Carrel-Dakin method are evident:

1. The irritation of the skin, an irritation which sometimes is very painful and may persist for a long time. To minimize this it is essential not only to protect the skin by yellow vaselin but that minute care also be taken to insure the exact strength of the solution. Below 0.40 per cent the germicidal action is too feeble. Above 0.50 per cent the solution is too irritating. This means that the solution must be most carefully made and tested and that fresh solutions must be constantly prepared (cf. p. 88).

2. The solutions, when in contact with the wound exudates, lose their chlorin in an hour or even less time and become inert. Hence the need of a new supply of the fluid every two hours. This constant care, day and night, the care not to use too much or too little, the expense of so much solution, apparatus, and dressing, etc., make the method time-consuming and costly. Above all, it requires a large staff of doctors and nurses.

3. In order to obtain the maximum germicidal effect of weak hypochlorite solutions, it is necessary to keep them in constant contact with all surfaces of the wound. This means that dependent, the most efficient, drainage must be avoided.

4. It is impossible to keep up the treatment during transit for any distance. The dichloramin-T paste (p. 93), while much less desirable at this stage, can be substituted, as it usually requires only one daily dressing. (Keen, W. W. The Treatment of War Wounds. Ed. 2. Phila., W. B. Saunders Co., 1918.)

Fig. 1.

commend or to condemn any feature by itself. We shall admit, I think, that adequate drainage, protection against secondary infection and immobilization are good but a careful combination of all of these is necessary to secure regularly the results that I have described.

It is quite impossible to arrive at conclusions regarding the "rest method" for wounds without a considerable clinical observation or experience with exactly the methods I have described. The difference in the appearance and general condition of the patient is so striking that it must be seen to be appreciated. It seems necessary to demonstrate personally also to each surgeon that the presence of a certain amount of purulent discharge in and about the wound for a few days or even a few weeks does no harm.

The important and essential features of treatment, the protection of the wound and the part against infection, irritation by chemicals, irritative motion, etc., are the things that are necessary for wound healing, for protection against septicemia and metastatic infection and for recovery without deformity and disability.

In a few words it seems to me that what we have not done in the treatment of infected wounds and what we must do is to perfect our methods for the exclusion of infection and to provide the most favorable conditions for healing in correct position. This is necessary not only for recovery without deformity and disability but because injured and diseased parts in correct position and at rest are favored as to recovery by relief of muscle spasm, pain, shock, etc. and by the advantage given to the circulation and other natural forces of repair.

It is desired to add that preceding and following the reading of this paper typical and successful cases treated by this method were presented and described by Dr. Leo Mayer, Dr. S. Kleinberg, Dr. E. Weigel and Dr. Fred H. Albee of New York. Acknowledgement must be made also of successful treatment of several hundred such cases by Dr. F. J. Gaenslen of Milwaukee, Dr. Ellis Jones of Los Angeles, Dr. Arthur Steindler of Iowa City, Dr. Melvin S. Henderson of Rochester, Dr. Emil Geist of Minneapolis, Dr. Willis Campbell of Memphis, Dr. H. B. Thomas of Chicago, Dr. W. R. Laird of Montgomery, West Virginia, Dr. M. C. Harding of San Diego, Dr. Archa Wilcox of Minneapolis and others.

Further reports of cases treated by this method are requested.

The following is submitted as an illustrative case:

H. F. F., male, aged forty-one, was thrown from a wagon and caught between the wagon and a tree when a team of horses became unmanageable.

A physician was called and found a compound comminuted fracture at the lower end of the left femur. The patient was brought at once forty miles to the hospital and I saw him on the operating table. No roentgenograms were taken as the damaged parts were in full view on account of the compound injury.

Traction was applied immediately to both

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

feet in a manner previously described. Full length of the injured limb having been obtained and the knee having been supported by overhead slings on the traction table, the wound was cleaned up as carefully as possible. Some damaged tissue and foreign material were removed. Attached bone fragments were permitted to remain. The popliteal space was widely exposed, all the vessels being visible as well as palpable. There was no damage to any of the principal vessels or nerves.

Full length and exact position of the femur fragments as to rotation having been obtained on the traction table, the wound was wiped out with tincture of iodin and alcohol and then packed gently open with vaselin gauze. The entire wound area was covered over with vaselin gauze and a dry sterile pad. Ice tongs were inserted in the condyles of the femur as shown in Figure 1. A double plaster of Paris spica was put on with the ice-tongs imbedded in the cast.

From this time forward for six weeks nothing was done. At the end of that time a window was made in the cast, the ice tongs were removed and a new dressing put on. The wound was almost healed. A second dressing was done four weeks later, ten weeks from the time of the injury. At this time the cast was removed and good consolidation of the fragments had taken place. A single spica was applied. The single spica was left on until June 1, at which time the cast was removed and a ring caliper knee splint applied (Fig. 4).

The roentgenograms shown in Figures 2 and 3 were taken July 7, approximately four months after injury. Sound healing of the wound had continued and there was firm union with full length in good position. Knee joint motion was begun for the first time. It is to be noted that there were no postoperative antiseptic dressings. In ten weeks only two dressings had been done.

On October 4 the patient was asked to come to the office for the photographs shown in Figures 4, 5 and 6. Figure 4 shows the patient in the caliper splint. Figure 5 shows full weight bearing on the injured limb without additional support. Figure 6 shows the amount of knee motion, seven months from the time of injury.

This is the routine method in our cases of bone and joint infection. Both the operation and the after care are simplified to the greatest possible degree and the results both in our hands and in the hands of others who are applying the method have been almost without exception exactly as they have been in this case.

[Discussion of Dr. Orr's paper will be found on pp. 475, 476, 480–485.]

FOUR CASES OF OSTEOMYELITIS*

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CASE I. Rose B., eight years old, has had osteomyelitis of the right big toe for about a year. She had an operation soon after the onset of the osteomyelitis but the wound is not healed and she has had a persistent sinus, swelling of the toe and disability.

Our examination showed extensive involvement of the proximal phalanx of right big toe. On April 12, 1927, an operation was performed. All of the diseased tissue was removed, the wound was packed with vaseline gauze and a splint applied. The splint was not removed for a number of weeks at which time it was found that the cavity was filled with granulation tissue and there was no further active infection. The wound healed rapidly and has remained healed.

Roentgenograms show satisfactory regeneration of bone.

CASE II. Milton G., three years old, was brought to the Hospital for Ruptured and Crippled because of swelling of the right ankle and leg. His trouble started three weeks previously, since which time he had had pain in the right ankle, swelling and tenderness of the lower part of the leg and persistent fever.

Roentgenograms showed extensive destruction of the lower extremity of the tibia, the disease invading the ankle joint. An operation was performed on March 21, 1927. The abscessed cavity was exposed, the diseased bone was removed, the cavity was packed with vaseline gauze and a plaster of Paris bandage was applied from the toes to the knee. The bandage was removed three weeks later when it was found that the cavity was filled with granulation tissue which looked healthy. The surface healed rapidly and has remained healed since then.

A recent examination showed that the boy walks without a limp, the wound remains healed and he has no symptoms referable to the affected member.

CASE III. William, S., fifty-two years old, was seen first on April 29, 1927. He had osteomyelitis of the lower half of the left leg. One and a half years ago he sustained a compound fracture of the left leg. Osteomyelitis developed. He has had several operations, but they have been unsuccessful. The symptoms have persisted and several sinuses remained unhealed.

On May 3, 1927, an operation was performed. All of the diseased tissue was removed. The wound was packed with vaseline gauze and left widely open. A plaster of Paris bandage was applied. The first dressing was done three weeks after the operation, and subsequent dressings have been done at very infrequent intervals. The wound has been healed completely since August, 1927, since which time the patient has had no symptoms and walks about liberally.

CASE IV. Herman F., thirty-two years old, had an osteomyelitis of the right sacroiliac area four years ago. He was operated upon, the wound healed after innumerable dressings, but he has had several relapses since.

On May 20, 1927, an operation was performed. A large wound was made. The diseased tissue was thoroughly curetted and removed. The wound was packed with vaseline gauze and a plaster of Paris spica bandage was applied. The original dressing was left on for four weeks. Since then he has had very few dressings. The wound was healed completely by October 1, 1927, and he has had no symptoms referable to his back since then.

* Read before Section of Orthopedic Surgery, New York Academy of Medicine, November 18, 1927.

[Editor's note: Dr. Kleinberg's case reports are presented to illustrate further the Orr method of treatment.]

THE ORR METHOD IN THE TREATMENT OF CHRONIC OSTEOMYELITIS*

A CRITIQUE

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NEW YORK

THE Orr method has attracted much attention and it well deserves earnest consideration and discussion. In criticizing it, which I mean to do, it is only fair to say at the outset that I have not used it. It does not appeal to me. In considering the method as a whole, one must discuss its essential components. As presented by Dr. Orr tonight, and in his publications concerning the treatment of chronic osteomyelitis, these essential components are: (1) primary extensive osteotomy; (2) avoidance of antiseptics and chemical irritants in treatment of the wound; (3) extensive and prolonged immobilization of the extremity in plaster of Paris, and (4) long delay (several weeks) before changing the first dressing.

1. Dr. Orr advocates as the routine treatment in chronic osteomyelitis a primary operation consisting in extensive chiselling away of bone structure and the preparation of a boat-shaped cavity (saucerization) to be made contiguous with the wound margins by being packed wide open with vaselined gauze. He advocates doing this without waiting for the formation of sequestrum or involucrum! This part of the Orr method is, of course, not new; indeed, it is quite old. It was, and to a large extent still is, the accepted surgical practice. It is what I as an intern was taught to do thirty years ago. My maturer observations and my experiences in handling chronic osteomyelitis lead me to assert that as a routine procedure it is wrong.

When there is suppuration in chronic osteomyelitis one should provide, if need be, adequate drainage through the soft parts, but in my judgment if there is no actual sequestrum, he should delay further procedure until it has developed. To chisel away more or less necrotic bone before there is a complete sequestration is not a good practice. It is an operation in which in the nature of things one does too much or too little; it involves a more extensive operation than may be needed, and a more prolonged confinement to bed.

For some years I have been preaching[1] for chronic osteomyelitis not only that one should whenever possible delay attack upon the bone itself until a sequestrum has fully formed, but also that one should then content himself for the time being at least with the simple removal of the sequestrum or sequestra. Very often, indeed, *in spite of overhanging bone*, this will be all that is needed to effect not only cessation of suppuration but also definitive healing. I have seen it happen again and again. Let me cite but two cases by way of illustration:

In June, 1926 there was admitted to my service at the Hospital for Joint Diseases a girl twelve years old who had been operated on some months before for acute osteomyelitis of the humerus and who had three moderately discharging sinuses leading to the upper half of the shaft of the bone. Roentgenograms showed about two-thirds of the length of the diaphysis extensively porous, necrotic, with incompletely formed sequestra, and with only beginning involucrum formation (Fig. 1). If a radical operation had then been

[1] Attenuated bone infections. Considerations in the treatment of osteomyelitis. *J. A. M. A.*, 1925, lxxxv, 1782.

* Discussion at meeting of Section of Orthopedic Surgery, New York Academy of Medicine, November 18, 1927.

performed, removing all the diseased bone, most of the length of the humerus would have been resected, and in the almost complete absence of involucrum to bridge this defect, the arm would have collapsed. I discharged the child from the hospital under observation, and had her readmitted five months later (November, 1926), at which time roentgenograms showed that there was a well-formed supporting involucrum and that the process of necrosis had resolved into three slender sequestra each about two inches long, lying in three separate cavities communicating, respectively, with the three sinuses (Fig. 2). An incision was made through each of these, the cloacae in the bone were enlarged only sufficiently to remove the sequestra by morcellation, and a small gauze wick was inserted into each cavity for drainage. These were removed in a few days. The wounds closed over rapidly and completely and have remained soundly healed ever since (now one year). Roentgenograms today show the humerus as a solid shaft of healthy bone, and at present well healed, *with no cavities* (Fig. 3).

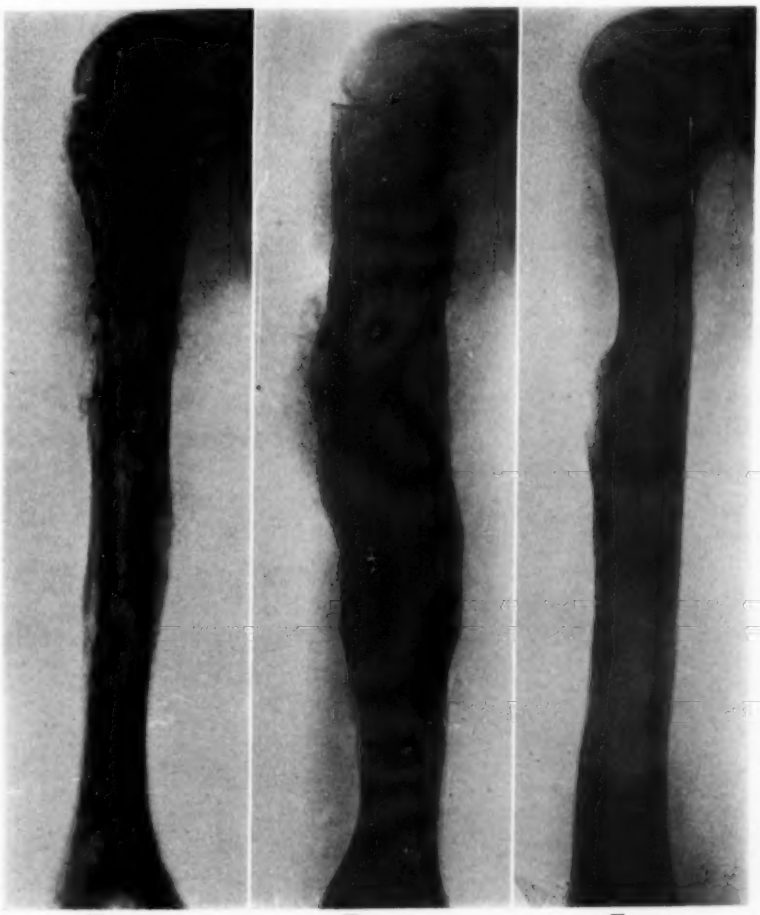

Fig. 1. Fig. 2. Fig. 3.

Fig. 1. M. D. May 26, 1926. Extensive necrosis involving two-thirds of the shaft of the humerus with only slight involucrum formation.

Fig. 2. M. D. Six months later (November 13, 1926). A very solid supporting involucrum has formed and there are now three sequestra lying in three discrete cavities.

Fig. 3. M. D. One year after Figure 2 (November 19, 1927). The humerus now shows a fairly normal shaft of healthy bone with no cavity and no area of necrosis. No operation for the chronic osteomyelitis was performed in this case except the simple removal of the three sequestra shown in Figure 2.

A boy six years old was admitted to my service last July with an osteomyelitis of the tibia of two months standing. A

suppurating sinus in the shin lead into a large cavity in the upper third of the shaft, containing a good-sized sequestrum, and discharging through a comparatively small opening in the bone. This was enlarged sufficiently to extract the sequestrum. The cavity was drained with gauze only until the discharge was serous.

FIG. 4. J. L. August 17, 1927. One month after simple removal of sequestrum from the cavity in the upper third of the tibia.

FIG. 5. J. L. September 2, 1927. About seven weeks after simple sequestrectomy. Note that the cavity is smaller.

Then the drain was discarded and the skin was allowed to heal over the cavity. It has remained solidly healed[1] and roentgenograms have showed progressive diminution in the size of the cavity (Figs. 4, 5, 6).

You will note that the operations in these, as in most such cases, are comparatively minor and involve little or no confinement to bed. I appreciate that they are contrary to the widely accepted belief that sound healing cannot take place over a "dead space" in the bone, that overhanging bone must be removed, and that healing must take place from the bottom. That belief was also opposed as an argument when I began my treatment of chronic bone abscesses by simple evacuation through a small drill hole. Yet I have shown again and again that such chronic abscesses are usually sterile, or contain attenuated organisms, and that simple drill drainage not only promptly relieves pain but also is followed by definitive healing even though the bone cavity, small or large, cortical or medullary, remains indefinitely.

I hope I will not be understood as believing that saucerization is never needed to effect a cure. It is sometimes needed, of

[1] Still well healed in February, 1928.

course. In my opinion, however, such an operation should not be a primary procedure in chronic osteomyelitis but should be delayed until both its necessity and its extent are definitely demonstrated.

I hope, too, that I shall not be understood as counselling delay in acute osteomyelitis. In a recent article[1] Dr. Orr cited me as advocating delay and in a context implying that I referred to *acute* osteomyelitis.

2. Concerning the use of antiseptics I agree with Dr. Orr insofar that I regard them as of limited service in ridding a wound of organisms and in effecting healing. I am by no means ready, however, to cast them aside entirely, especially the proper use of Dakin's solution, which often helps to stimulate healthy granulations and is very useful in freeing a wound of adherent sloughs. There are, too, some wound infections, notably, contamination by Bacillus pyocyaneus, that demand antiseptics. I find that daily dusting with powdered boric acid is fairly specific for this contamination. I would ask Dr. Orr how he gets rid of it without antiseptics, and I would point out, too, that contamination with Bacillus pyocyaneus, as may well occur in chronic osteomyelitis, will produce a sorry mess and an unholy stench if confined for weeks in a plaster cast, as in the Orr method. Moreover, is Dr. Orr entirely consistent in railing against antiseptics and chemical tissue irritants, when he tells us that at the end of the operation he floods the wound with tincture of iodine and then with alcohol!

3. I fail to see the necessity or even the desirability of extensive and prolonged immobilization of the extremity in a plaster of Paris cast. I do not find that patients with chronic osteomyelitis suffer so much with muscle spasm after operation that such immobilization is necessary. I cannot see the need of immobilizing the knee and the hip after an operation for osteomyelitis in the neighborhood of the ankle—and in small children Dr. Orr encases in plaster not only the hip on the affected side, but both hips. In addition to the other objections to prolonged fixation in a plaster cast that I shall mention, it may conceal and delay the discovery of the development of another focus of infection in the same or a neighboring bone.

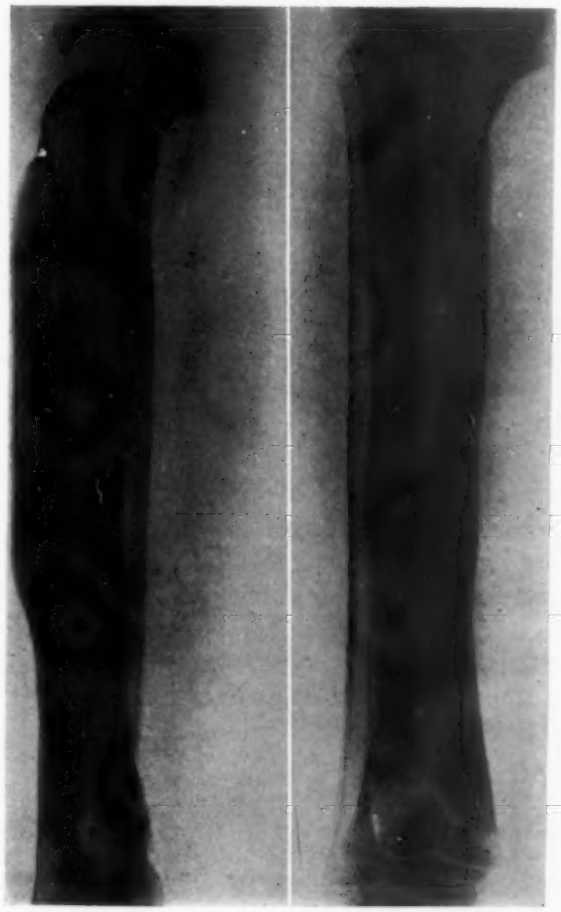

Fig. 6. J. L. October 17, 1927. Six and one-half weeks after Figure 5. The bone cavity is much smaller. No operation was done for the chronic osteomyelitis in this case except the removal of the sequestrum from the bone cavity over which the skin soon healed and has remained well healed. Note that the roentgenogram shows a small focus of bone absorption in the lower third of the tibia. Here a small abscess formed in January, 1928, and closed after simple incision

I am familiar with Dr. Orr's notions concerning the desirability of fixing the joints. In the A.E.F. he advocated it in the treatment of gunshot fractures when most of us were committed to joint mobili-

[1] Orr, H. W. Treatment of osteomyelitis and other infected wounds. *Surg. Gynec. & Obst.*, 1927, xlv, 446.

zation in traction-suspension apparatus. Dr. Orr believes that joint stiffness is due not to fixation but to infection. I am among the many who believe that prolonged immobilization produces muscle atrophy, bone atrophy and joint stiffness. Recovery from such stiffness is fairly rapid in children but in adults it often takes a long time, prolonging the period before they may resume their occupations.

In the treatment of fractures of the shaft of the femur, reduction and immediate immobilization in plaster of Paris is admissible in children and young adolescents when the fracture is transverse and satisfactory reduction is thus at once attained. I would also approve were an adult with transverse fracture of the femur so treated if an exceptional circumstance, as, for example, the need for immediate travel, made it desirable. Speaking generally, however, I am with those who object to the primary treatment of fracture of the adult femur shaft in a plaster cast, even if combined with skeletal traction as Dr. Orr has described, and who believe that a better result, functionally if not also anatomically, will be secured by the intelligently employed traction-supension method, without joint fixation and with active joint motion encouraged as early as is expedient.

4. I cannot agree with Dr. Orr that it is important to delay the first dressing for many weeks. After an extensive osteotomy with the wound packed wide open it is, indeed, very desirable to leave this packing in situ until the wound is fully lined with granulations. This, however, does not take many weeks. Removal of the packing (which is easy and painless if, as Orr recommends, the gauze is impregnated with vaseline) at the end of about a fortnight will show the cavity satisfactorily granulating; and thereafter, with ordinary surgical care, the wound is not apt to be secondarily infected by dressings at reasonable intervals. I cannot see what is gained by delaying this first dressing so long that the odor becomes an offense to the patient and to all about him. Dr. Orr has told me that by the time there is a bad odor he has sent the patient home in his plaster cast. But is that odor any more endurable in the home than in the hospital?

While I am frankly not favorably impressed with the "Orr method," and not in agreement with all the principles upon which it is based, I believe that it emphasizes some important practical teachings. Dr. Orr deserves commendation for insisting, first, that well-planned operations (in which, however, he is more radical than I) are far more important than antiseptics in effecting healing and cure; and, second, that it is desirable to delay dressings in order to obviate pain and reinfection.

DISCUSSION OF DR. ORR'S PAPER

Dr. Frederic W. Bancroft. I came here tonight very much in doubt in regard to Dr. Orr's method, as I have never used it. He brought out some factors, however, that are of great interest. The surgical principles which he uses during the operation are sound. He drains adequately without unnecessary trauma.

To compare any series of cases of osteomyelitis with any other series is difficult, on account of the various factors involved, that is, the age of the child, the virulence of the infecting organism, the resistance of the individual, and the bone involved. It is also very difficult to compare statistics in different hospitals in relation to the use of the Carrel-Dakin treatment. Crile's description of the Carrel-Dakin treatment I think is excellent. That is, it consists of the principles of the dog's lick. Anyone who has seen a dog constantly cleanse a wound with his tongue without inflicting any trauma will recognize this point. Frequently the Carrel-Dakin treatment is abused and much trauma is done at each dressing. If done with care, satisfactory results ensue.

Dr. Orr drains his case carefully and well and then puts the part absolutely at rest. That healing can and does occur with his method of treatment is adequately shown. If we assume that acute osteomyelitis starts as an embolus in one of the terminal branches

of the nutrient artery and that bone necrosis proceeds by retrograde thrombosis of this artery, then by Orr's primary operation of removing the lid and adequately draining the septic cavity without trauma, and without inflicting trauma in his later dressings, he has made a marked contribution. I should like to know whether the prolonged immobilization of the joints produces bone atrophy and joint stiffness, and whether his cases are able to regain their ordinary function as quickly as cases treated with Carrel-Dakinization where mobilization of joints occurs earlier. It has been my practice in osteomyelitis to remove the lid from the cavity if there is pus under tension, and to insert Carrel tubes so that the solution drains into the cavity. No packing or trauma is produced in the cavity, for if packing is inserted, then removed and re-packed daily, factors are introduced which tend to favor retrograde thrombosis and secondary infection.

The real treatment in osteomyelitis is the early recognition of the disease within twenty-four hours, and immediate operation. If this can be done, secondary sequestration will be greatly reduced and the period of disability shortened tremendously.

Dr. Walton Martin. In his treatment of infected bones Dr. Orr has emphasized the value of immobilization, rest and protection from injury in contrast to the little worth of frequent flushing of wounds with antiseptics, especially when combined with disturbance of wound surfaces and edges. There are theoretical considerations deduced from experimental work and practical experience gained during the Great War which bear him out.

I should like to call attention to the experiments of Giani, made twenty-three years ago. He made fresh wounds in susceptible animals, then laid as gently as possible filter paper soaked in pure cultures of anthrax bacilli on the wound, two, six, eight, ten and fourteen hours after the wound was inflicted. The animals were protected from infection by the layer of round cells which rapidly accumulated beneath the wound surface and the protection was more marked the longer the interval after the wound was made. Most of the animals lived while controls died. If, however, he broke through the layer of cells by inadvertent roughness in his manipulation, and this was made evident by slight bleeding, the animals regularly died. In other words, secondary infection and reinfection can readily be caused by slight breaches in the walls of a granulating wound.

During the war it was generally recognized that if a heavily contaminated wound filled with foreign bodies and devitalized tissue had been converted into a slightly contaminated one lined by vital tissue by a surgical operation, the wound could often be closed by primary suture provided that the patient could be kept at rest. If, however, it was necessary to disturb the wound surface by transporting the patient, the delicate balance between resistance and infection was upset, the body cells were no longer able in many instances to destroy the remaining microorganisms and infection resulted. The rule was not to attempt primary suture unless rest of a week or ten days could be insured.

In regard to antiseptics, there are certain general principles which are important to keep in mind. First, that chemicals act by combining with the protein of bacteria; second, the antiseptic has a tendency to combine with other substances with which it comes in contact; third, it is rapidly used up in these combinations; fourth, the active cells on which the combating of infection is dependent are more delicate and more readily destroyed than the bacilli. All these relations were carefully studied and the results published in a monograph by Douglas, Fleming and Colebrook in 1920, reviewing the experience of the Great War. They seem to show equally good results when using salt solution instead of Dakin's solution. The painstaking technique of Carrel, with insistence on the avoidance of trauma and secondary infection, accomplished the results largely probably through the intermittent flushing of the wound and the lytic action of the Dakin's solution.

In general in the treatment of infection it seems to me well to keep in mind that the surgeon does not cure infection. He creates conditions which he has learned by experience aid the body cells to overcome successfully the invading microorganisms. When infection has become established purely surgical measures have little influence on the virulence or number of the infecting microparasites, but removing sequestra and foreign bodies, converting shut-in cavities in the tissues containing exudate under tension to wide open spaces with shelving sides, has a most extraordinary influence on localized pyogenic infection.

I do not believe that the odor caused by decomposition of the discharges set up by bacteria, probably saprophytic, has much influence on the course of infection. As a rule the unpleasant smell is repulsive to the patient and interferes with the appetite. When the dressings smell, even if there is no temperature, I believe it is an indication that they need to be changed.

I find myself in agreement with the general principles of Dr. Orr's treatment. There are, however, so many grades of pyogenic infection, such a variety of forms, that I should rather see a widespread knowledge of the underlying principles emphasized than a rigid standardization of treatment.

Dr. Fred H. Albee. In reference to mobilization or immobilization, the latter is a moot question that hardly two men will discuss alike.

I have been a great enthusiast over the Carrel-Dakin treatment. I had extensive experience with it during the war and was with Dr. Carrel for a time at Compiègne.

My experience with the Orr method has been limited to four cases. I believe that in selected cases it has distinct advantages. One of my cases was a young woman of twenty-three with acute osteomyelitis who had been treated before I saw her by small multiple skin incisions without drainage of the canal, although there was involvement of the whole anterior part of the tibia for three fourths of its length. The woman had become very nervous and daily dressings had been done for seven weeks under an anesthetic. There was elevation of temperature to 102°.

The advantages of avoiding daily dressings under a general anesthetic were obvious, as the patient was becoming more nervous from former treatment. Therefore I decided to try the Orr treatment. This necessitated dressings every three to five weeks. The case progressed very well but the temperature rose to 103° after the application of the cast, coming down on the second day to 99°. The case was left on for five weeks. I went to Europe and the dressing remained on for the entire time that I was gone, the case being under the observation of my associates.

The Orr treatment eliminated the necessity for frequent anesthetization and the patient's nervousness decreased. I am sure that no one would argue for Carrel-Dakinization in a case like that. The result was most satisfactory.

As to immobilization, I think there has been much misapprehension about that. Immobilization does not produce permanent atrophy. Pain from lack of immobilization is more likely to do so, for pain causes continued spasm of the muscle, and this produces atrophy. Many times efficient immobilization, if proper physiotherapy is carried out afterward, will prevent permanent stiffening of the joint, rather than produce it.

Dr. Leo Mayer. I think we should try to clinch the argument tonight in the discussion, considering there are many points on which we disagree. There are two or three questions I want to ask Dr. Orr. First, has Dr. Orr observed a parallel series of cases, with immobilization and without? I am not referring to fractures for they have to be immobilized in proper position. I am referring to cases of osteomyelitis in the central portion of the tibia. I cannot see why the plaster should have any particular effect. But I am going to try it in certain cases and compare it with some cases without. I think it is indicated in the neighborhood of some joint but not in the middle of the long bones.

The second question I want to ask Dr. Orr is, has he run a parallel series of cases, changing the superficial dressing when necessary but leaving the tampon in place? The odor is unpleasant; why not remove it if possible, leaving the vaseline gauze in place and preserving asepsis? Why object to cutting open the plaster? I do not see why we cannot remove the superficial dressing and leave the deep ones in place. I have seen cases where by a small incision and a small opening a long standing sinus was cured; I am therefore not convinced that saucerization is always necessary.

Dr. Armitage Whitman. Should we use this method of Dr. Orr's to the exclusion of all others? In individual patients one encounters individual pathological conditions, and the type of operation should be chosen according to its suitability to a given case. We may agree that the saucerization operation is ideal but we shall surely encounter cases in which its employment is impossible.

Another point, and a most important one: who dresses the wound after operation? When we first went abroad in 1917, I read with great interest Dr. Carrel's descriptions of large cavities with small outlets continually filled with Dakin's solution and healing from the bottom upward. When we got to France we

found it necessary to modify his treatment. The wound was laid wide open, packed from the bottom with gauze and Dakinized. When we did the dressings ourselves, healing under ideal conditions ensued. When the dressings were done by inexperienced hands the results were very different. We had an opportunity later to watch Pedro Chutro's method, and the same experience was repeated. I emphasize this historical fragment because the single method of treatment is a pit into which the very best are prone to fall.

Dr. Orr had a large and painful experience abroad. I can imagine the type of so-called Carrel-Dakin dressings that he saw, and the deplorable results, and can quite agree with him that most of the cases he embarked for transport would have arrived in this country in much better condition had he been allowed to apply his method of treatment and encase them in foolproof plaster bandages. Those conditions, however, were fortunately exceptional, and I am not prepared to apply the lessons that we learned from them *in toto* to civilian practise.

Dr. Elmer P. Weigel. I agree with Dr. Whitman that treatment of all these conditions cannot be standardized. There are different indications for treatment presenting themselves in different cases.

My only experience with the Orr method has been in chronic osteomyelitis. Two or three years ago I was skeptical about it but having been reassured by the men who have tried it, we have adapted the treatment in osteomyelitis cases. I have treated eight cases and in each one my experience has been entirely satisfactory. I was particularly impressed with the extreme comfort with which these patients were treated. It is possible at the end of two weeks to change the dressings without disturbing the packing. The patients are more comfortable than with the Carrel-Dakin treatment.

Dr. Abraham O. Wilensky. I have followed Dr. Orr's work carefully and think there are occasions where his method can be advantageously used and others where it can be just as advantageously not used. There is a marked difference between wounds of bone and wounds in the soft tissues, and a difference between acute and chronic osteomyelitis. Any wound will heal if there is no bacterial or mechanical impediment to its healing. Sometimes the elimination of these impediments will occur naturally and sometimes it becomes necessary to help these natural processes by operative means. In acute osteomyelitis much should be left to nature and Dr. Orr's method or better still, a modification of it might be advantageously used.

Given a wound in which there are no impedimenta to healing, almost any form of dressing will result in healing. Dr. Orr's method is valuable in that it points out the advantages of allowing nature to work undisturbed, but it is unnecessary to go to the extremes that he does and to allow wounds to go undressed for the periods that he advises. In some, I do not want to say many, this apparent conservative attitude will defeat its own ends, and in many of the lesser wounds and infections the method is entirely unnecessary. This method is valuable if one mixes with it a certain amount of common sense.

In bone wounds one should leave as much as possible, and this means in many cases everything, to nature. Firstly, because one does not know the extent of the secondary effects of the original thrombophlebitis and, secondly, because any operative procedure produces much traumatic disturbance which many times increases the effects of the primary thrombophlebitis. In acute joint infections one should treat the factor which produced the joint infection, bone or other, and leave the joint itself to do as much as possible by the natural processes of repair.

Finally, I am sure that gentleness in handling tissues is the most important thing we can learn. In infections this becomes of dominating importance.

Dr. Orr. I should like to express my gratitude to all those who have taken part in the discussion. So much territory has been covered that I must first ask you to believe that I really have an answer for every question that has been asked but I shall not be able to give all these answers this evening. There are many important points, however, that have been raised in the discussion and I shall deal with these to the best of my ability.

Dr. Bancroft speaks of the variation in virulence of the bacteria attacking in these cases. It has been my observation that the apparent virulence of the organism is usually promptly modified by correct treatment. I mean by that, of course, that the organism becomes more virulent if the patient is not relieved by prompt drainage; also, if the

patient is drained and then re-infection developes a septicemia, he gives an appearance of virulence of infection which is really due to other causes.

Regarding the question as to bone atrophy, we do, of course, in some of these cases get extreme decalcification, but we all know that restoration of bone strength comes rapidly in a limb that is recovering. As soon as splints and braces can be left off and infection is healed the matter of bone atrophy takes care of itself in a short time.

My attitude toward the acute case may be expressed by what I have said regarding the relative importance of drainage and immobilization. If I were suffering myself from an acute osteomyelitis and had to choose between drainage alone and immobilization alone, I think I should choose immobilization for the reason that drainage will usually take care of itself in a short time. Drainage without immobilization renders the patient liable not only to rapid extension of infection, pain, irritation, etc., but to contracture deformity and extreme disability as well. Of course it is my belief that both drainage and immobilization are necessary.

Dr. Martin's remarks with reference to the protective wall of leucocytes that forms about a wound or inflammatory area where there is an acute infection are, of course, of great importance. Everything that I have said regarding the protection of the wound has been said with this point in mind. All of the methods of daily dressings are objectionable for the reason that they damage this wall. If we can preserve this protective wall and keep out additional infection as well, by non-irritating, non-absorbent dressings, we are giving the wound an opportunity to sterilize itself and to protect itself against invasion from the outside. My comments upon the work of Professor Chutro and his employment of the Carrel-Dakin method have been somewhat extreme because I wish to make my points with regard to protecting the wound and immobilization. One knows, of course, that the Carrel-Dakin technique in competent hands is a good method for cleaning up a wound and for preventing septicemia. On the other hand it causes an amount of disturbance to the damaged part and to the patient out of all proportion to the value of the antiseptic treatment.

Dr. Brickner's criticism that I am inconsistent in using any antiseptic in the wound is, perhaps, deserved. In employing tincture of iodin and alcohol following operation of these cases and at the time of my infrequent dressings, I am apparently violating the principles that the wound should not be disturbed and that antiseptics should not be applied directly to the surface. My excuse, however, is that these are used in an effort to exclude infection from the wound and not to deal with infection in the manner that is so commonly being employed when the effort is made to destroy infection in the wound day after day. This I believe to be impossible and injurious to the patient. Even if we ever do find the ideal antiseptic and may employ it to destroy infection in a wound such as we commonly have in osteomyelitis or in compound fracture, I think we shall still do well to employ it in the occasional manner that I describe and not as a daily dressing. If pus organisms and even gas bacilli can be excluded from the wound in this manner with the patient put in the best condition and position for restoration, his prospects for recovery are thereby improved. As to the actual length of time that must elapse between an operation and the first dressing or between subsequent dressings, that must, of course, be left to be decided according to the circumstances. I am not willing to say, however, that every surgeon or every doctor shall make that decision. If those of us who have had more experience and who have given special thought to this subject cannot outline a fairly definite program for the care of these patients by which others may be guided, then, after all, our special experience and special training are worth nothing.

No one appreciates more than I do that the method I have proposed is still imperfect in many respects. Those of you like Dr. Albee, Dr. Mayer, Dr. Whitman, Dr. Brickner and others, who are willing to think it over and test it out in your hospitals and laboratories, can, I am sure, assist us in arriving at methods and details of technique that will greatly improve our results in this difficult class of cases.

Dr. Brickner's suggestion about waiting for sequestrum formation and for the protective involucrum before opening up the chronic cases has proved to be valuable in many cases. One point that I am trying to make is that in the acute case or even in the early chronic case extensive sequestration can be avoided by more thorough drainage. The extensive death

of bone that leads to the formation of large sequestra often is due to the spread of an original infection which has not been adequately drained. If we can do any early drainage, it should be done as soon as we see the patient, whether this is the second day of his attack or the tenth. In this way extensive bone necrosis can usually be prevented and the patient's chance for recovery without great damage improved.

Drill holes as advocated by Starr are inadequate in many cases; in fact we consider that more extensive drainage is necessary in whatever stage most of these patients come to us for operation. Dr. Brickner's method of lifting out a sequestrum and closing the cavity is open to the objection that in some cases pockets of infection may be covered up and lead to recurrence or new trouble. Some of these certainly do heal at the time but we have all seen cases that have been treated by this manner or by skin flap, muscle flaps, fat flaps, etc., who have further bone destruction and sequestration and who require second, third and perhaps other operations.

As to the stiffness of the neighboring joints, that is a point that always comes up for discussion. My point is that such stiffness is caused not by immobilization but by the extension of infection into the joints and into the structures about the joints. If an infected area is adequately drained and if the extension of infection is thus prevented, it does not matter how long the cast is left on, the amount of stiffness will be only as much as is caused by inflammatory adhesions, bony or otherwise.

I must express my appreciation to Dr. Albee, Dr. Mayer, Dr. Kleinberg and Dr. Weigel for having presented their interesting patients and for their discussions. It is perfectly obvious, of course, that these gentlemen are dealing with these patients from the standpoint of fundamental principles and that is all that is necessary. If Dr. Mayer can treat his patients without prolonged immobilization and can prove that it is not necessary, I shall be glad to modify my technique accordingly. At the same time Dr. Mayer is correct in saying that I do not trust many surgeons to do frequent dressings. I feel sure they will get secondary infections if they attempt it. I have a natural feeling that my technique is as good as that of others and I know I cannot do this sort of thing without reinfecting wounds, usually very shortly. I have certainly arrived at the conclusion that exclusion of infection is simpler and easier and safer than to attempt to combat infection by frequent dressings and chemical antiseptics.

HYDATID CYST OF THE LUNGS

EXAMINED DURING THE LAST TWENTY YEARS, IDENTIFIED BY EITHER OPERATION OR AUTOPSY

CARLOS HEUSER, M.D.

BUENOS AIRES, ARGENTINA

THE tumors of the lungs which have come under my observation in the years of my practice of roentgenography amount to over a hundred cases, all of which had been operated upon either by myself or by colleagues who also had examined the cases.

In 1903 I examined my first case of hydatid cyst tumor in the lungs in association with Dr. Caride of Buenos Aires. The history follows:

CASE I. E. F., male, twenty-eight years old, had complained for the last six months previous of a bad cough accompanied by blood expectoration, etc. From all the symptoms the case was diagnosed as phthisis and treated accordingly. He had no temperature until the fourth day of our observation, when it was 38.4° to 38.6°c. in the afternoon.

Dr. Podesta, also a Buenos Aires physician, examined the patient and had him sent to Dr. Carides' Sanatorium. While there we examined him by roentgenogram in which an enormous cyst tumor was plainly shown. I would like to mention that this was the first roentgenogram of hydatid cyst of the lungs made in Buenos Aires. The diagnosis of hydatid cyst was made because we found it had a definite round form free around the borders.

There was no other symptom except the reverberation on the side. In August, 1903, the ninth rib was removed, the tumor was punctured, opened and dried. It proved to be a cyst tumor with many small subtumors.

From this cavity the membrane was extracted and was sewn to one side of the wall of the pleura. After about six months suppuration, it started healing and the cavity gradually filled out.

We have observed that tumors of the lungs develop as well on the right as on the left side, but we have also noticed that the left side is more often infected. The latter position is always a more serious one in the operative intervention, the reason being that patients die of gangrene of the lungs within six to eight days after the operation, unless the method of pneumothorax of Dr. Arce of Buenos Aires is employed. We lost two cases by gangrene before employing the method of the pneumothorax.

A diagnosis of tumor, hydatid cyst of the lungs, is not always an easy matter for, although the shade of the cyst tumor of the lungs is lighter than carcinoma or sarcoma of the lungs, it is nevertheless often mistaken for the latter, as I will show.

When the hydatid cyst tumor of the lungs is filled with a clear liquid it looks more transparent in the roentgenogram as the ribs can be seen through it; this is not the case if it is a suppurating tumor or a tumor with many subtumors.

I quote from my records some of the more interesting cases of hydatid cyst of the lungs on which I have operated.

CASE II. A working man, twenty-nine years old, living in the country, complained of pains in the right side, with a cough but without expectoration. We had him under observation for two weeks in the sanatorium and the clinical diagnosis was pleurisy. We made also a roentgenogram examination and found a dark shade in the back, the same extending on the right side of the lung up to the fifth rib. The diagnosis was that of hydatid cyst tumors in the lung.

Operation was decided upon. Two ribs were resected and after the puncture a crystal liquid was taken out and the membrane taken away. The cyst was very large with many subcysts.

When the cleaning was done and the field perfectly dry, a membrane was noticed

extending way down to the liver; when dried, this was found to be a cyst membrane, which was carefully taken away.

At the end of four weeks during which the fever had been persistent, the size of the liver had increased. Another operation was decided upon. The abdomen was opened in the mammilary line, and all precautions having been taken, the liver was punctured and pus taken out. A cyst membrane was then extracted and dried. The wound in the lungs (pleural region) was in communication with the liver cavity. At the end of seven months the patient was discharged cured.

Case III. S. V., thirty-two years old, single' arrived from the country with temperature of 39°c. in the afternoon. She complained of spitting blood and what we determined was a small hydatid cyst.

At the clinical examination a dullness was noticed spreading over the whole cardiac region down to the fourth rib, and extending back to the vertebral column.

The diagnosis was open cyst, suppurating. An operation was decided upon. We proceeded to the resection of two ribs and the lungs were sewn to the pleural border.

While the operation on the lungs was going on, the cavity opened and a large quantity of pus poured forth with many small cysts. For four days there was a continuous cough. On the fifth day after the operation we proceeded to wash out the cavity with a sterilized solution of chinosol and to our great surprise the patient nearly died of asphyxia. That was because the cyst opened into the bronchus and water got into the lungs. Fortunately the patient recovered from this attack and after four months of treatment she was sent to the country still with the cavity open to be treated at her home.

Two months later, the patient came back complaining still of an enormous suppuration from the wound. An immediate roentgenogram examination was made. To our great surprise there were plainly shown three india rubber drainage tubes in the cavity.

It developed that during the after treatment in the country, the patient, while informing the doctor of the disappearance of the tubes, did not state what had become of them, so a new one was inserted each time and the old ones remained. In the roentgenogram the three tubes could be plainly seen.

The tubes were taken out during the following two months and the patient sent home cured.

Case IV. A woman thirty-eight years old, who came from Dolores, a small town in Buenos Aires Province. For two years this woman complained of a cough with purulent expectoration sometimes combined with blood. She had been under treatment by local physicians but with no result.

At our clinical examination diagnosis was made of pulmonary tuberculosis, prompted because both sides were dull and patient had a temperature of 37.6°c. every evening. In the roentgenogram examination we observed a large dark shadow in the lung which we diagnosed as multiple hydatid cyst.

We decided on an operation. We located the cyst between the ninth and tenth intercostal space of the breast. We resected the ninth and tenth ribs, punctured the lungs in this space but without result, but when puncturing the sixth intercostal space in the breast we met with the cyst which was opened and all that was possible was taken out.

This proved to us that roentgenogram examination for cyst of the lungs should always be done by having the patient in a standing as well as in a lying position.

Eight days after the operation the high temperature of the patient had not subsided and under roentgenogram examination we discovered another cyst following the line of the omoplate. Before operating we made another puncture at that point, located the cyst and operated at once.

After this second intervention nothing new developed and the patient left in due time, cured.

Case V. A letter carrier, twenty-nine years old, came to us complaining that he had been expectorating blood for some time. The clinical examination was absolutely without result as to symptoms, except that a few râles could be detected at the left side. In the roentgenogram examination we found a dark shadow covering the heart. Our diagnosis was then hydatid cyst.

Operation was decided upon. We proceeded to the resection of the fifth rib, punctured the intercostal space in several directions and a pneumothorax was produced which changed all conditions.

We placed the patient on the roentgen-ray table. The cyst could be plainly seen. We punctured at this place and removed it, but unfortunately this patient died twenty-four hours after the operation.

It was thus proved that when pneumothorax is produced during the operation it is hard to find a hydatid cyst, the reason being that when the lungs collapse the cyst changes its position.

Case vi. A woman forty-eight years old, who came from the town of Balcarce, Buenos Aires Province. She complained of great pains in the right side of the lungs and of expectoration of much pus and secretion. She also had chills and high temperature and had been under treatment by a local physician who had diagnosed the case as purulent pleurisy.

After our clinical examination we found all the symptoms of pleurisy and on account of the high temperature and chills also came to the conclusion that it was a purulent pleurisy.

At the roentgenogram examination we saw a dark shadow covering the right lung completely and were unable to define precisely either the inferior or the superior parts of the lungs. According to the roentgenogram the diagram was purulent pleurisy.

We decided on operation. We resected two ribs to make an opening large enough to have a large and effective drainage. The lungs were harpooned and the pleura opened. An immense quantity of pus poured out, intermixed with a large quantity of small cysts. After six months of treatment the patient was sent home on the way to recovery.

After three months the patient returned again with the same symptoms of purulent pleurisy. The roentgenogram showed clearly proof of pneumothorax superior with a cyst on the inferior side.

We operated again, removed the cyst and the patient was discharged after four months as cured.

Case vii. A girl, twenty-six years old, had been operated upon for hydatid cyst of the liver in May, 1909, by one of my colleagues.

She came under my observation six months after the operation, complaining of a considerable discharge of pus from a fistula which had formed at the place of operation. In November of the same year we inserted a catheter through the fistula, and made a roentgenogram. We noticed on the side a round well-defined shadow which we diagnosed as hydatid cyst intercostal, situated between the liver and the axillary line.

We opened at the place indicated, removed the cyst and the patient left three months afterwards, cured.

Case viii. A man, forty years old, who came to us in January, 1912, complaining of a fatiguing cough with blood expectoration.

In the clinical examination a shadow with a rounded bottom was found on the right side. Our diagnosis pronounced it hydatid cyst of the lungs. The roentgenogram examination showed a dark shadow extending from the superior part to the middle of the lungs. As the shadow was rather dark we decided it to be a sarcoma of the lungs.

Operation was performed and the surgical intervention met with a hard mass, some of which was taken out for pathological examination. This proved to be actinomicosis. Three days afterwards the patient died and the autopsy conformed this diagnosis.

Case ix. A man, fifty-two years old, came to our clinic with all the symptoms of a large aneurysm. Roentgenogram examination showed this to be aneurysm and also a large hydatid cyst.

We kept this patient under examination for six days and he complained continually of great oppression, difficulty in walking, fatigue and great pain in the chest. As not much could be done for him he was sent home.

Two days afterwards he had great vomiting spells, expectorating large amounts of small cysts and blood. He died soon after. At the autopsy we found a perforation of the large sack in the cavity of the cyst.

Case x. A laborer, twenty-six years old, came to our clinic for examination. He complained of fatigue, cough and abundant expectoration. In the examination of the latter there was found Bacillus Koch.

At the clinical examination there were all the symptoms of foci of pulmonary tuberculosis. At roentgenogram examination we found in the left lung also all the symptoms of tuberculosis and also a well defined hydatid cyst.

We operated for the latter; the cyst was drained, cleaned and dried and after six months

the patient was discharged as cured. This occurred in 1916, seven years ago and I am glad to state that this case is today perfectly well, as I have been able to keep him under observation from time to time.

Case XI. We found a round mass covering the whole superior part of the right lung, which we classified at the time as cancer of the lungs. Some months after this case had come under our observation, he died. In the autopsy it was found that he had cancer of the stomach *as well as* of the lungs.

Case XII. The roentgenogram showed two shadows on the left lung of the patient. In this case we employed the artificial pneumothorax following the procedure of Professor Arce of Buenos Aires University, injecting at the first time 150 c.c. and three days later 250 c.c. Three days after the second injection we operated, emptied and dried the cyst. Three months after this operation another intervention was required and another cyst was taken out in the same position as the first one, but situated a little deeper. Two years afterwards the patient returned complaining of great pains at the seat of the operation. Roentgenogram showed pleurisy adhesions and pneumothorax superior. The patient is still under treatment.

Case XIII. A young man about twenty-two years old. He complained of severe pains on the side of the right lung.

The clinical examination showed a large shadow in the posterior part following the line of the omoplate. The case was diagnosed as pleurisy. The roentgenogram examination proved it to be a cyst on the inferior surface of the lung.

At the operation we found the diaphragm pushed upward. We cut the same, punctured the cyst and took out a cyst membrane on the superior part of the liver. After four months the patient was discharged as cured.

Case XIV. A woman, thirty-five years old.

In the clinical examination we found an enlargement of the liver. The roentgenogram examination proved it to be cyst of the liver on the anterior surface.

At the operation the two lower ribs were resected to make a better examination of the liver possible, but nothing was found. The wound was closed but by sounding further up a supradiaphragmatic cyst was found. This was operated upon and patient left after four months, cured.

Case XV. A woman, thirty years old. She complained of fatigue, cough and bloody expectoration.

In the clinical examination a supracardiac shadow spreading over the whole precordial region at the left side was observed. At the right side the heart was found by percussion to be enlarged. The phenomena of pericarditis with all the noises was evident at the clinical examination.

In the roentgenogram examination the shadow of a double cyst could be plainly seen, which could be better seen in the posterior than the anterior part of the patient.

In this case the pneumothorax was used. Four injections of 200 c.c. each time were made and we operated.

The fifth rib was resected, the cysts were punctured, the membrane taken away and as the liquid entered the pleural cavity another incision in the inferior part of the left lung was made according to the procedure of Dr. Arce. The patient left the clinic after six months, cured.

Case XVI. A woman, forty-five years old when she came under our clinical observation. Sixteen years before we had seen her, in 1906, her inferior maxillary was operated upon by Dr. Solar of Buenos Aires. The previous diagnosis had been periostitis. But the operation showed that it was a hydatid cyst in the maxillary bone. Seven months after this operation she went home apparently cured.

In June, 1923, sixteen years after this operation she came to us with a very inflamed and swollen face. The examination showed the lower maxillary very much enlarged. In the roentgenogram examination we found two large hydatid cysts in the maxillary bone.

The patient was immediately operated upon, the cysts punctured and dried. During the operation it was found that the maxillary bone was partly destroyed and a small piece was taken out. The anatomical pathological examination proved it to be sarcoma. This was treated with deep roentgen-ray therapy.

One week after the deep roentgen-ray treatment a large roentgen-ray burn showed on the

tongue, gums and throat. The patient could not take any nourishment and died three months after the operation. In the autopsy we found besides the roentgen-ray burns in mouth and throat, sarcoma of the liver and intestine.

Experience has taught us the following:

1. The diagnosis of hydatid cyst of the lung is not an easy matter.

2. The cysts may occur on either side of the lungs.

3. Clinical examination is not sufficient to prevent the mistake of diagnosing hydatid cyst as pleurisy or as some other disease.

4. Lung hydatid cyst can be associated with other diseases of the lung.

5. The operation of pulmonary cyst is a very serious one, if the cyst is not adherent to the ribs.

6. When the cyst is not adherent the removal is more easily accomplished with a pneumothorax operation.

7. In the operation of a lung cyst and before the pleura is opened, it becomes necessary to harpoon the lungs and attach them to the sides of the rib. If not, the pneumothorax that will be produced will change the position of the cyst.

In presenting this brief paper, I have laid before you some of the results of my experience among another people and in a far-away country. I trust, however, that the results may be of general interest and may contribute to your success.

COLOSTOMY UNDER LOCAL ANESTHESIA

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CHICAGO

THE method of anesthesia for the performance of colostomies is an important one. The dread of a general anesthesia is almost universal, and moreover individuals suffering from chronic colonic disease are not, as a rule, ideal patients for abdominal surgery. They are usually debilitated, suffering from disturbed nutrition, their resistance is much reduced, they all suffer with chronic intestinal obstruction or perhaps acute obstruction, so that only the simplest technique is warranted. They are so very prone to complications resulting from anesthetic accidents when ether is employed, that when complete surgical narcosis is deemed necessary I much prefer the use of gas and oxygen combined with local anesthesia. Most of my colostomies are carried out with the use of local regional anesthesia produced by the infiltration of ½ per cent solution of butyn. If the abdomen is greatly distended, and it is apparent that the intestine will protrude immediately the abdomen is opened, general anesthesia is necessary.

As the operation under local anesthesia is more tedious than when performed under general narcosis, every little thing should be done to add a possible comfort to the patient. The table should be covered with a pad four to five inches thick. Most operating tables are insufficiently padded. Patients will complain of the table being very hard after a few moments, lying on the ordinary operating table. For this reason I have an extra blanket folded and placed under the regular table pad. This may explain many of our patients' complaints of backache following general anesthetics.

During the entire operation a most careful handling of the tissues is essential. Rough wiping of the wound, tearing of the tissues, or unnecessary pulling with the retractors by a careless assistant, causes pain by dragging upon structures outside the anesthetized area, and this is often sufficient to cause restlessness and apprehension on the part of the patient which may end in complete demoralization. It is the neglect in observing these small and apparently trivial details that is responsible for many of the failures with local anesthesia and often results in undeserved condemnation of the method.

Methods of applying the local anesthetic comprise:

(1) Infiltration: the injection of the solution into the field of operation and well beyond the site of traumatism.

(2) Conduction: (a) topical; (b) deposit of the solution in the spinal canal or on a nerve trunk supplying the given area, regional anesthesia or nerve blocking.

The most simple method of producing local anesthesia is the infiltration or the edematization of the tissues in and about the site of operation. By the regional methods the nerves are blocked proximally to the site of operation and this is necessarily a more difficult procedure, demanding a thorough knowledge of the nerve supply to the operative field.

A combination of both methods is often advisable.

TECHNIQUE OF ANESTHESIA

Infiltration. It is not necessary to apply the anesthetizing agent directly to the tissues to be incised, but it may be applied entirely outside of the line of incision and thus secure good anesthesia which will be maintained until after the completion of the operation. The extent of the anesthesia depends upon the distention pressure on the nerve ends caused by the

amount of solution injected rather than the strength of the drug used. If a narrow strip of wheals is produced and the incision made through the centre of it, the solution escapes and the tension on the infiltration is relieved and when the skin closure is attempted, the needle enters unanesthetized skin in certain places causing great pain.

With the patient lying supine the initial injection is made at the left costal arch near the xiphoid process of the sternum and successive wheals are raised along the left costal margin to the tip of the eleventh rib, and from that point to the iliac crest.

The subdermal infiltration is carried downward the entire distance. Drops of the butyn solution raise the wheals as the needle is advanced. In this manner the needle is carried forward just under the skin.

The long needle (10 cm.) is best for this purpose. It is inserted within the margins of the anesthetic wheal first made and advanced, injecting the solutions as the needle is being pushed forward. In making injections over a wide subcutaneous area or in the deeper injections, the position of the needle is changed continually, injecting as the needle is pushed in different directions and to various depths. In making the deep injections it is necessary to puncture the skin in but a few places, as the long needle will cover a very large area when pushed in different directions.

A most important point in the technique, little emphasized, is to always inject with the needle advancing or during its withdrawal, but never with the point stationary, because of the danger of an intravenous dose. By keeping the needle moving the necessity for aspiration is eliminated.

The skin and superficial fat being anesthetized, the deeper fat may require some infiltration but usually not much. The needle is next inserted vertically until it is felt to pierce the fascia of the rectus muscle. Our patient evinces pain as this aponeurosis is reached and this sign also helps to recognize this fascia. Thirty c.c. of the butyn solution is deposited in the fascia along this line and then the needle is carried to the outer border of the rectus. This outer border where the sheaths of the external oblique and the rectus join is recognized by increased resistance to the needle. After this fascia has been well cared for the needle is carried through the rectus to the preperitoneal fat. This fat must be slowly and thoroughly infiltrated because it is a most sensitive structure. In patients of average weight, 100 c.c. of the 0.5 per cent solution may be necessary for an abdominal field block, and very large stout persons may require 150 c.c. of the anesthetic solution.

As the sigmoid comes into view it is grasped with rubber tipped forceps and its mesentery is infiltrated with 20 c.c. of anesthetic solution.

In making the abdominal section gentleness is most important. Farr[1] says "Even with a perfect anesthetization the pressure produced by the use of a dull scalpel will cause the patient discomfort. In order to meet this contingency the skin should be elevated between two pairs of towel clips while the incision is being made. A sharp scalpel is used and multiple gliding strokes are made rather than a forceful pressure of the blade through the tissues."

Local anesthesia with one-half to one per cent butyn is ideal for many cases and certainly reduces the anesthetic risk, although it is not in itself entirely devoid of danger. However, the case must be carefully chosen for local anesthesia, as pain is a question of tolerance which varies in different patients. What will be pain to one will not be complained of by another, and if the patient is highly nervous or temperamental, general anesthesia is to be preferred. The dangers of butyn are, first, injecting it directly into a vein, and second, the absorption of too large quantities. Idiosyncrasies to butyn are extremely rare.

[1] Farr, R. E. Practical Local Anesthesia and Its Surgical Technique. Phila., Lea and Febiger, 1923, p. 153.

DETORSION AND STABILIZATION OF THE FIFTH LUMBAR VERTEBRA IN SCOLIOSIS*

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SCOLIOSIS still remains one of the most difficult problems in orthopedic surgery. Until recently the investigation of its treatment has dealt almost entirely with methods for its non-operative correction. It is only since the development of spinal stabilization that there has been any real incentive to study it from the operative point of view. In the work thus far reported, the apex of the primary curve has been the center of attack, stabilization being performed with the object of limiting deformity, usually only in the more severe cases. The only instance of operative interference in other portions of the curve which a search of recent literature has disclosed is that reported by Hibbs in which fusion of the fifth lumbar was performed in cases presenting excessive mobility of this vertebra. The operative procedure to be now presented attacks the lowest portion of the curve; it has for its object not only the limitation of deformity through stabilization of the fifth lumbar but also the establishment of an actual corrective force on the curve itself through the change in position of the vertebra which is applicable to scoliosis of any degree presenting the changes in the fifth lumbar to be described.

About four years ago while examining the roentgenogram of a case which had proven particularly resistant to the usual methods of correction, I was struck anew by the marked wedging of the fifth lumbar vertebra and its evident influence in aggravating the lumbar curve. It seemed clear that if the body could only be lifted on the depressed side, the curve would necessarily be greatly decreased. This idea of affecting the lumbar curve by tilting the base of support must be a very old one, since the elevation of the buttock on the side of the convexity in sitting and the lengthening of the leg in standing have long been well established details of treatment. As far as I knew, however, no one had determined the effect on the scoliosis of either conservative or operative correction of this apparent distortion of the fifth lumbar alone. Study of the problem from both these standpoints was accordingly undertaken.

In order to determine the effect on the scoliosis brought about by the conservative correction of this change in the lumbosacral region, it seemed best to disregard the dorsal deformity entirely. The body was accordingly immobilized in the following position: The patient was placed on the orthopedic table with the peroneal post in position. The pelvis was fixed by carrying the leg on the side of the convexity well over in the opposite direction and the trunk was then forced toward the same side as far as it would go with the spine moving in a purely lateral direction. A spica was now applied, the plaster being carried down on the leg as far as the ankle. It was found that the maximum amount of correction at the lumbosacral junction was obtained at the time of the application, no further gain at this point being noted after the patient was immobilized for a long period, nor through the application of successive casts. In one case this corrective spica was kept on for four months, the patient being recumbent, and was followed by a jacket, carried well down over the trochanter on the side of the

* Read before Section of Orthopedic Surgery, New York Academy of Medicine, January 20, 1928.

convexity to maintain the correction, which was worn for about six months, the patient being up and about. A reinforced corset was then used. At the end of the four months immobilization in the spica, the entire scoliosis seemed definitely diminished to ordinary inspection, but the only certain improvement that could be demonstrated roentgenographically was a moderate correction of the lumbar curve. When the patient was allowed up, this correction was maintained as long as the jacket was worn but when the reinforced corset was substituted, the deformity gradually returned to its original degree. It was evident, therefore, that some form of operative fixation was essential and that there was no necessity for a period of preliminary immobilization.

The following operation was devised to correct the apparent change in position of the fifth lumbar vertebra and to stabilize it in its new position: The fifth lumbar and upper part of the sacrum are exposed and the lateral articulations are freed of cartilage after the technique of the spinal fusion. The fifth lumbar is then lifted upward and backward on the side of the convexity by means of a heavy periosteal elevator or special instrument, using the sacrum as a fulcrum, and is held in this position by means of a specially shaped wedge of bone placed between the articular facets of the fifth lumbar and the sacrum. The remaining technique of spinal fusion is then carried out. Then the spica, which has been made previously, is applied to immobilize the spine and leg in the position already described. The patient is kept in this cast for the usual time required for fusion to take place. After the removal of the cast, a corset with side bars is worn during the day for three to six months and the spica applied at night. The usual physiotherapy is carried out.

The wedge of bone inserted between the facets is about one-half inch wide, one inch long and of sufficient thickness to maintain the maximum amount of separation and elevation.

Experience has shown it is not possible to use a wedge any thicker than one-fourth to three-eighth inch above and one-half to five-eighth inch below. In the beginning the wedges were made from the spinous process of the fourth lumbar but since this is composed of cancellous bone, it seems likely that under the very considerable force exerted a certain amount of crushing results before fusion takes place and thus the full effect of the operation is not secured. For this and other obvious reasons it is better to have wedges of different sizes previously prepared from beef bone. When the wedge is shaped as described, it is firmly gripped by the facets after the periosteal elevator is withdrawn and shows no tendency to slip. Should it not seem secure enough, however, it can be fastened securely by means of a small bone peg.

In considering the change in position of the vertebra produced by this unilateral separation of the facets, a study of the dried specimen demonstrates that the vertebra is elevated obliquely and rotated in a reverse direction to the curve. It can also be shown on the specimen that the separation of the facets blocks motion toward the side of the convexity. When a second wedge is inserted between the fourth and fifth lumbar, a greatly increased deflection toward the opposite side results. By this operation, therefore, not only is the lumbosacral joint, which in this affection seems to possess excessive mobility, stabilized but the vertebra is tilted and rotated in such a manner as to exert a definite corrective force on the curve.

The applicability of the operation is still to be established. It seems clear, however, that it should be considered only in those cases in which an apparent wedging of the fifth lumbar can be demonstrated by roentgenographic examination. Naturally the most favorable cases would appear to be those in which the lumbar curve is the primary one. The feasibility of performing the same operation at the base of the dorsal curve is being studied. It must be pointed

out that this procedure is a much less radical one than the fusion operation as now applied to scoliosis, in that since only one vertebral joint is stabilized, interference with the normal flexibility of the spine is relatively slight and hence the operation can probably be used in the less severe cases.

CASE REPORT[1]

The patient, Marie H., age nineteen, had been under treatment at various clinics since about her ninth year. She came under observation at the Orthopaedic Department of the Allegheny General Hospital in 1924, where the customary corrective jackets and exercises were used for two years. The scoliosis, which was of the right dorsal-left lumbar type, proved unusually resistant and it was not possible to obtain any permanent improvement in this time. Both the dorsal and lumbar curves were very pronounced, particularly the latter. The right hip was unusually prominent and in order to reduce this prominence and secure as much correction in the lumbar curve as possible, an elevation of one and one-half inch on the left shoe was found necessary. The roentgenograms showed the apparent wedging of the fifth lumbar.

The operation of detorsion and fusion at the lumbosacral joint was performed on May 27, 1926. Recumbency was maintained in the corrective spica for four months, following which a corset was used for the day and the cast applied at night. Resumption of activity was carried out very gradually so that it was three months before the patient was going about in her usual manner, making the total period of protection ten months in all. Since that time all support has been discarded.

The roentgenograms taken immediately after operation and at frequent intervals since show that the change in the position obtained by the insertion of the wedge between the facets has been maintained with a consequent improvement in the lumbar curve. To ordinary inspection the symmetry of the trunk as a whole has been and still is steadily improving.

[1] Only the first case operated upon is being reported as in it alone has sufficient time elapsed since operation for a final estimation of the degree of improvement to be made. Up to the present time the operation has been performed in five other cases.

SCOLIOSIS TREATED BY FUSION

PRELIMINARY REPORT OF SOME OBSERVATIONS IN 348 CASES*

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THIS is a preliminary report of a study now in progress of structural lateral curvature cases treated by the Hibbs fusion operation at the New York Orthopaedic Hospital. It includes a total of 348 cases and covers a period from June, 1914 to December, 1926. Because the study is incomplete, no detailed statistical data will be given. Herewith follows a few observations.

Almost one half of the cases were caused by infantile paralysis. Nearly an equal number were of undetermined etiology. The few remaining cases were due to congenital conditions, rickets, and empyema.

The operation of the spine fusion is one of only moderate severity. In over one-half of the series the operative time was less than one and one-half hours. In only a few exceptions did the postoperative temperature go beyond 103°. The mortality rate was 1.1 per cent. Postoperative shock and pneumonia were the causes of death.

An area of natural fusion of the posterior elements was found at operation in a few cases. In no instance was this fusion adequate to prevent an increase of deformity.

Corrective gymnastics with or without jackets are of only temporary value in the treatment of the progressive scoliotics. In order to hold a correction and prevent the progress of a lateral curvature, stabilization is necessary. Our results show that this is accomplished by the spine fusion operation.

Many of the older patients were operated because of pain and fatigue in the poorly mobile curvature. All recovered from their symptoms except one, in whom the area of fusion was inadequate. Practically all in the series showed that their general health was improved, and that they have felt better since the operation. Excluding the few in whom the proper area was not adequately fused, all had an improvement in posture.

The area of fusion must be accurately selected. Fusion of a compensatory and not the primary curve resulted in an increase of the deformity. In a few cases difficulty was experienced in the selection of the primary curve. Incomplete roentgenographic records of the entire spine were not infrequently responsible for this error. A fusion of fifth lumbar and sacrum in only a very few cases stabilized a curvature of the lower spine.

The stabilized area must be adequate. In not a few the fusion did not extend low enough. This was especially noticed in the cases of paralytic origin and most marked in those with imbalanced abdominal musculature.

The correction gained by preoperative traction and turnbuckle jackets was not always maintained in the earlier cases operated. In these external support was not constant nor was it worn long enough after the operation. This error was corrected in the more recent cases by the use of a fixed jacket for six to twelve months after operation, depending on the amount of correction obtained.

Too short a period of follow-up resulted in an inconclusive estimate of our findings. A few of the younger cases of this series showed no great change in the degree of deformity until they reached the age of rapid growth.

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A pseudoarthrosis or failure of fusion occurred in less than 3 per cent of the series. In these there was an increase of curvature at one place. One was due to a fracture, resulting from an injury about two years after operation.

In conclusion: spine fusion will prevent an increase of scoliosis if the area of fusion is adequate and accurately selected; in older patients relief from pain is obtained. This results in an improvement in posture, and general well being of the patient.

DISCUSSION OF DR. STEELE'S AND DR. RISSER'S PAPERS

Dr. Russel A. Hibbs. The problem of scoliosis is a very difficult one. We have had enough experience to justify the statement that the fusion operation is of great benefit in scoliosis. The errors which we have made in the past have been due in some instances to not fusing a longer area of the column, and in others in poor selection of the area of fusion. I am inclined to think that in most instances where the fused area has increased in deformity pseudoarthrosis is present; this has not been proven in all cases, however, by exploratory operation, though in some instances it has; the roentgen-ray pictures thus far do not give us conclusive evidence on this point.

Dr. Armitage Whitman. I think Dr. Steele has opened a valuable field for further exploration in that small group of cases in which he feels that an abnormality of the fifth lumbar vertebra is the cause of scoliosis. If there is an anatomical variation it classes the case under the head of congenital scoliosis and the logical thing to do is to stabilize the foundation as one would wish to square up the foundation of the leaning tower of Pisa.

I have been interested in operating upon ordinary cases of scoliosis in attempting by manual force, applied by a bone forceps to the exposed spinous process, to correct the rotation. I found this to be possible to a slight extent, but on removing the force the vertebrae at once slipped back to their original position—a fact which increased my scepticism as to the claims of osteopaths and chiropractors. I think Dr. Steele's bone block insertion is a logical thing to do and I shall be interested if he later reports this treatment to have been permanently successful.

Dr. Risser's paper leaves little to be said. I think a sharper line might be drawn between paralytic and idiopathic scoliosis. In the former class operation is logical and I heartily concur with what he said as to its effect upon the patient's general condition. Many cases of the severest types of deformity have been passed over because the operative risk seemed so great, but I am convinced that the risk is justified and the operation indicated, for we know how few of these patients otherwise survive to an advanced age.

There is another thing that I wish to emphasize, that is, the improvement of posture in general. Too little attention has been given to the effect of posture in general. We see these patients coming to the clinic for gymnastic exercises in all sorts of slumped attitudes hold themselves correctly under direction for a few moments and go home again in the same slouching shamefaced way. I sometimes wish that I could have a talk with each parent separately and make him or her realize that it does not much matter what kind of a back one has provided one holds oneself erect. A crooked back held straight looks straighter than a straight back slumped. If you can get it into a patient's head that it is his back and his responsibility to hold himself straight, the degree of deformity of his spine is of comparatively little importance.

What Dr. Hibbs said about end results is true. You never know until a particular patient is dead whether or not a cure has been permanent. However, three of my girl patients have married and borne children without increase in their deformities; that is the surest test I know of.

Dr. Leo Mayer. I do not believe every case should be operated upon. I remember three cases of my own in which operation had been advised by other orthopedic surgeons; one was congenital, one paralytic and one idiopathic. The operation was refused, however, and non-operative treatment has not only prevented the curves from becoming worse, but their appearances are absolutely normal and their posture proven to be of very high order. I am doing the operation of fusing the spine and doing more each year but there are cases that

can be kept straight by non-operative measures. They should be studied with extreme care to find out in which operative and in which non-operative treatment should be given and also, in the former, which type of operation should be done.

It is possible that in the cases where the deformity has increased at the site of operation, the area fused was too small. In our cases we are fusing more and more of the spine in two-stage operations, first the lumbar and then the dorsal spine, and the results seem to be very much better.

Another type of case demanding special attention is that where there is a marked list of the body to one side; in that type we have not succeeded in getting results in fusion. We have gotten better results with a prop, implanting a long bone graft from the crest of the ilium upward to the apex of the curve.

Dr. Reginald H. Sayre. I remember that MacKenzie Forbes some years ago advocated very much the same thing and at that time I said I was sorry he had suggested it because I was afraid someone would be tempted to do it on account of his reputation. I myself some years ago had cases that I felt were just the ones to which this treatment might be applicable. There was marked wedging of the fifth lumbar vertebra and I felt theoretically that if I cut down on that it would be logical to expect improvement. I did not do the operation, however, because I doubted my ability to do so successfully. I shall look forward with interest to Dr. Steele's further report and hope that time will show that this bone chip he describes will be practically useful and that it will not work loose.

I agree with Dr. Hibbs that roentgenograms are sometimes very misleading. A condition shown in the upright disappears when the patient is in the recumbent position.

I was very much interested in Dr. Risser's statistics although I do not agree with the conclusions drawn from them. In most of the operations in lateral curvature the only result is an unsightly scar added to an already hideous deformity. In cases I have seen presented before this Society in person and by picture, I have been unable to discern where their posture or beauty has been improved, although I believe there are a few cases of paralysis which it is intelligent, practical and useful to operate. But with regard to the opinion that it should be done in the vast number of cases with the idea of improving lateral curvature, I disagree. I agree with Dr. Whitman that if you can mentally impress these cases with the necessity of doing something for themselves they can vastly improve. If they can be induced to practice them every hour there are three or four exercises that will benefit them; they can be done at school, at home, at the shop, any place. Patients come to my clinic once a week and work faithfully and do that work at home, but they do these special exercises once an hour and get a great deal better.

I speak from inexperience from the operative standpoint but I feel this town has run mad with the idea of operative treatment in scoliosis. There is just as much fashion in medicine as there is in clothes and it might be well to await the outcome of these preliminary reports before wholesale operations in spinal curvature are adopted as suitable.

Dr. Leon T. LeWald. I was interested in Dr. Hibbs' point regarding the diagnosis of pseudoarthrosis and the failure of the roentgen ray to establish it. This, I think, could be done by taking enough stereoscopic exposures with the patient in various positions just as one distinguishes if there is non-union or fibrous union in fracture of the neck of the femur, by making a roentgenograph first in adduction and then in abduction and if necessary also in rotation in and rotation out. Similarly in determining the question of pseudoarthrosis of the fused spine, it would be advisable to make roentgenographic exposures in anteroposterior and especially direct lateral positions, first with the spine straight, then flexed as much as possible and then extended as far as possible. Then by very careful study and comparison of all the roentgenographs one ought to be in a position to express an opinion in regard to the presence or absence of a false joint.

Dr. Arthur Krida. I should like to ask Dr. Risser a question concerning the selection of the site and extent of fusion. This recurred several times in his paper, but he told us little or nothing regarding the criteria he uses in this determination. There is another question that occurs to me; he spoke of correction in terms of certain angles and I should like him to enlarge on the method used in determining these angles. The term "wedge" has been used on several occasions in both papers in reference to the fifth lumbar vertebra. As I understand

it, this term should be restricted to those cases in which there is actual deformity of the body of the vertebra; in the cases under discussion it would appear that the deformity was in the nature of a tilt and the term "wedge" might be restricted to cases in which there is actual deformity of vertebral body.

It seemed to me that there was one statement in Dr. Risser's paper that contained potential dynamite and that was that methods of treatment of scoliosis by gymnastics were of no avail but were on the contrary harmful. I think this should be elaborated further, for we are all aware that scoliotics are habitually treated by gymnastics and that orthopedic surgeons so prescribe. If there is good evidence that this is harmful or at least of so little avail, the evidence and the conclusion to be drawn therefrom should be given the widest possible publicity.

Dr. Risser. In answer to Dr. Krida's question about the selection of the area of fusion, I will say that it is one of our most difficult problems. Our policy has been to fuse from neutral vertebra to neutral vertebra. Recently, we have fused down beyond the neutral vertebra, especially in paralytics and particularly in those with imbalanced abdominal musculature.

The gymnasium work referred to has in mind correction of a progressive curvature and not gymnasium for general health or posture. Our experience is that the progressive scoliotic increases more rapidly with corrective gymnastics. Gymnasium treatment in these cases is wise only when the stretching and loosening up of the deformity is followed by fusion. In the mature curvature cases, that is, those who have passed the age of rapid growth and whose curvature is well compensated, exercise for posture can be used to good advantage.

ANOMALIES OF THE APPENDIX

WITH REPORT OF A CASE OF CONGENITAL ABSENCE OF APPENDIX (AGENESIS) AND BICORNUATE UTERUS WITH ONE CERVIX

ADOLPH JACOBS, M.D.

NEW ORLEANS

AFTER reviewing the literature and considering the various commentaries made by the authors who have studied intensively the incidence of absence of the appendix, one would venture reluctantly to add another report of this unusual anomaly except in the face of undeniable evidence. Agreeing with Dailey to the extent that cases reported from the dissecting room or autopsy can be accepted with the least question of authenticity, still there are assuredly instances from the operating table, accompanied by evidence, identifying the condition without doubt.

CASE REPORT

A married woman, nineteen years of age, entered the Charity Hospital (Gynecological Service, 2A), New Orleans, Septmber 28, 1926. From the admitting office the tentative diagnosis of chronic pelvic inflammatory disease (pelvic abscess discharging large quantities of pus) was made. For one year she had had a foul discharge from the vagina. Regular menstruation had begun at fourteen years of age, of thirty day type, duration four days, moderate in amount, with only an occasional slight headache. She had been married three years with no pregnancies and no miscarriages. The patient affirms that there was no abdominal pain or previous operation. General physical examination showed nothing of importance. External genitals were puerile. Vaginal orifice was small. There was no discharge from the urethra or Bartholin glands, but a very foul odor was noticeable. Bimanual examination was very difficult but disclosed a very small cervix and on both adnexal sides an elongated, fixed mass, rather soft and tender, could be felt, seeming to lead into the posterior cul-de-sac. The contour of the body of the uterus could not be made out, owing to the tenseness of the abdominal muscles. Speculum disclosed a foul, greenish, thin pus, seeming to come from the cervix, which appeared very short. The vaginal mucous membrane was smooth with no cervical erosions. On closer examination a fold of mucosa was seen rising from the vaginal floor and lying transversely in front of the cervix, forming a blind pocket behind the cervix, from which also this foul discharge was coming. This fold lay so close to the posterior cervical lip that it was impossible to see the background of the pocket. By digital examination, however, a pit was felt which apparently led to the two pelvic masses noted in bimanual examination. It was concluded, without the history of abdominal pain or fever, that the two pelvic masses felt must be the source of the vaginal discharge through a fistulous opening in the vaginal wall. Proctoscopic investigation revealed nothing abnormal except the small cervix. The patient was kept under observation for three weeks, during which time the temperature was practically normal, with an occasional rise to 99 degrees and only on two days to 100–101 degrees. The pulse ranged between 84 and 96. Respiration 18–22. Leucocyte count was normal. Wassermann was negative. Urinalysis was negative. Culture made from the pus showed Bacillus coli, staphylococci, streptococci, micrococcus tetragenus and spore bearing bacilli.

Laparotomy was performed October 9, 1926. In exploring the pelvic cavity, two rudimentary, symmetrical, spindle-shaped uterine cornua were discovered, each measuring 5 or 6 cm. in length and about 3 cm. in the widest portion. These converged medially toward the cervix. To each of these rudimentary organs were attached a round ligament, tube and ovary, undeveloped. The round ligament was very slender and the ovaries very small, measuring about 2.5 by 1.5 cm. The tubes from

the uterine attachment to the fimbriae measured about 4.5 cm.; the width of the fimbrial extremity was about 1.5 cm. The peritoneum was smooth and glistening with no adhesions and no trace of any previous pathological condition. Further abdominal exploration disclosed no other abnormality except that investigation of the cecum showed it elongated, measuring approximately 10 cm. by 3 cm. in width, freely movable, lacking the usual haustration and joining the ascending colon at a right angle. The muscular, longitudinal bands on the outer, lateral aspect joined approximately 3 cm. from the ileocecal junction. No trace of an appendix or mesoappendix was found, and in this region, also, were no adhesions or cicatrices, nor evidence of any inflammatory process. The abdomen was closed and the patient made an uneventful recovery from this unnecessary operation.

On November 2, 1926, a barium enema was given and the roentgenogram report showed "no evidence of organic pathology. A loop of sigmoid was coiled up, practically in the true pelvis, suggesting adhesions which cannot be eliminated on the film alone." On November 4, by gastrointestinal roentgenogram series, absence of appendix could not be determined.

It was decided that the foul discharge was due to the various secretions from the vagina and cervix, admixed with the various organisms mentioned above, accumulating in the pocket behind the cervix which acted as a stagnant pool, and the lack of drainage was responsible for the existing condition. On January 21, 1927, a plastic operation was performed to do away with the pocket. An incision was made along the crest of the fold, separating the anterior from the posterior leaf, thus exposing the bulging rectum which was brushed downward and backward. The two leaves of the fold were excised to the level of the vaginal floor and the cut edges were sutured with continuous No. 1 chromic. A lipiodol injection was introduced

Fig. 1. Fig. 2.

Fig. 3. Fig. 4.

Figs. 1, 2, 3 and 4. Gastrointestinal series, taken with the view of detecting other abnormality in intestinal tract.

into the uterus, a plate of which is given herewith (Fig. 6).

After the second operation, the discharge still continued from the cervical canal, but the odor almost entirely disappeared. This disagreeable condition called for alleviation, hence, on February 11, 1927, under pericervical analgesia (0.5 per cent novocain) the cervix was well dilated and a sound introduced for

Fig. 5. Barium enema injection.

charge continued until the patient left on February 14, 1927. Three communications received on February 22, March 8 and on March 22, respectively, said that (1) while the discharge still continued, the odor had entirely disappeared; (2) that the discharge was practically nil and there was no odor; and (3) that she had menstruated as usual without any disturbance.

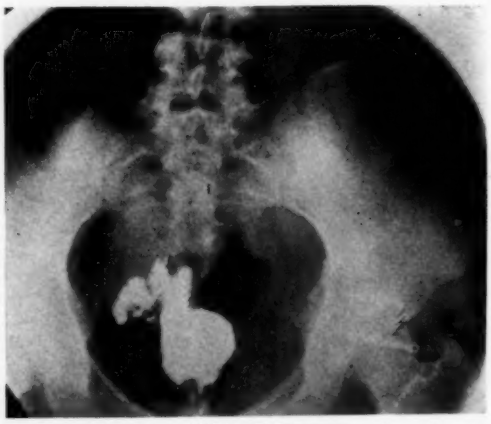

Fig. 6. Introduction of lipiodol into cervix. Note width of cervical canal with right cornua well represented. There was evidently an obstruction leading into the left cornua as only a thin streak of the lipiodol is shown. Bulky mass below represents a gauze pack saturated in lipiodol.

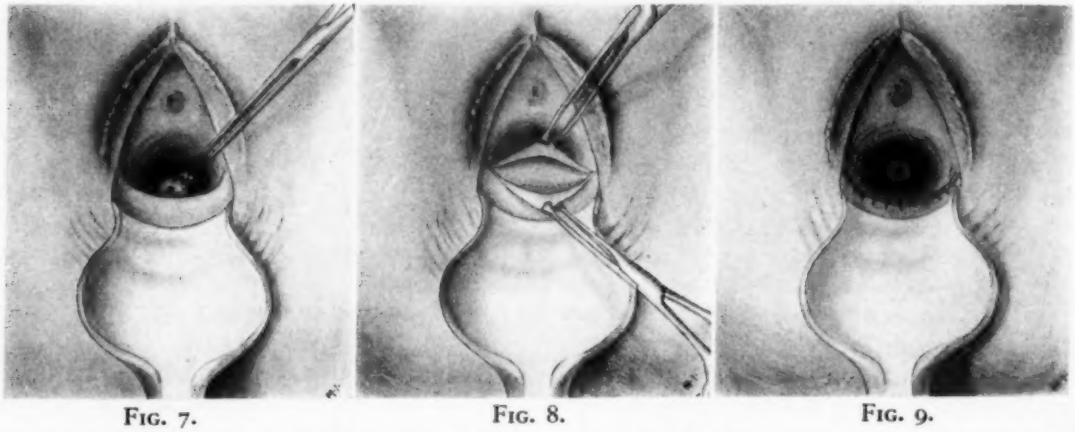

Fig. 7. Fig. 8. Fig. 9.

Figs. 7, 8 and 9. Diagrammatic drawings of the abnormal vaginal fold and cervix, and technique of operation for correction.

about 2.5 cm., when it met with definite obstruction. The endocervix was red and inflamed. With a dull heat, the cervical canal was cauterized and another injection of lipiodol was introduced. Iodoform gauze dipped in lipiodol was packed in the cervix and left for 96 hours. The lipiodol admixed with the dis-

TRUE AGENESIS RARE

The absence of the cecal appendix (true agenesis) is very rare in man. Extremely few authentic cases are reported in the literature and the various texts on anatomy and surgery are conspicuously silent, or

merely mention it. Cunningham (1907) states: "Its absence is sometimes noted." Gray (1910): "It is doubtful that the appendix is sometimes absent." Note is made, however, that according to some authorities the appendix is absent once in 10,000 cases. In the 1924 edition of Gray, mention of the absence of the appendix is entirely omitted. Attention is called simply to the variation in the size of the appendix and cecum respectively. Piersol (1919): "Total absence of the appendix is extremely rare but it has been observed by ourselves and others." Kelly and Hurdon in their classical treatise on the vermiform appendix and its diseases (1905): "Cases of the complete absence of the appendix have been described but it is to be doubted that such observations have always been accurate. Nevertheless there are a few authentic cases of complete absence of the appendix."

HISTORY

Before the seventeenth century the cecal appendix was barely known. The anatomists of that time were not even decided as to the names of the first part of the large intestine. The term appendix was often given to the cecum and no anatomist of that epoch claimed priority to the description of the small cecal prolongation, considered by them of little importance.

The first case of appendiceal absence recorded was by Morgagni who observed this anomaly in man. It excited considerable comment because of speculation as to the probable use and physiological importance of the organ.

Let us pause in passing to mention various functions attributed to the cecal appendix by some authors. Even as late as 1885, Treves, in his series of lectures on the anatomy of the intestinal canal and the peritoneum, writes of the very slight physiological importance of the appendix, showing that in his mind some rôle, however minor, was attributed to it. Sartorius, in 1724, attributes to the appendix the bizarre rôle of a receptacle for the lumbricoidis intestinalis. Sabatier, in 1791 said that "the appendix is always found filled with mucus and its use is to discharge into the cecum a fluid necessary to lubricate and mollify fecal matter and perhaps to stimulate peristalsis, so that it may contract with more force and thus empty itself with more ease of its fecal load." Sappey, in 1874, described the appendix as being a rudimentary organ without any important function; that, in some cases, it was found obliterated or in certain individuals excised without having caused any ill effects. Clado, in 1892, considering the appendix as a sort of glandular apparel annexed to the digestive tube, states that it is an organ with zymotic secretion and not one of absorption.

Certain authors, namely Lockwood and Rolleston and Kelynack, even doubt that the appendix is ever absent except as a result of disease or in consequence of a previous surgical operation. R. J. Berry, of Edinburgh, writing in the *Anatomische Anzeiger*, 1895, states: "Some authors have described total absence of the appendix. I do not, however, believe that the appendix is ever absent except as a result of a previous excision." Later the same author, as quoted by Gladstone in 1915, refers in 1907 to a specimen belonging to Fawcett: "The fact remains that it is the only case on record of congenital absence of the appendix vermiformis."

Dailey, considering the cases collected by Merling, estimates that the only authentic case is that of Meckel. This case was discovered in the course of an autopsy which permitted a minute dissection, and not a trace of pathology was discovered. Dailey does not grant authenticity except in those cases discovered during post mortem examinations.

In 1906, H. Heineck examined 3500 autopsy protocols at the Cook County Hospital with special reference to the appendix without finding a single case noting the absence of the organ.

As long as the appendix presents the usual dimensions, characteristic location

and appearance, it is easy to discover, but this is not so when it exists in an abnormal manner. According to Dailey, errors in reporting cases, as congenital absence, are due to various anatomical or pathological anomalies.

In order to have a clearer conception of the various states in which this vestigial organ is found, it would not be amiss to give a brief description of the development of the cecum and appendix.

DEVELOPMENT OF CECUM AND APPENDIX

Dr. Harold Cummings of the Department of Anatomy, Tulane University, New Orleans, says: "In the human embryo entering the second month of development the intestine is drawn toward the umbilical cord in the form of a simple U-shaped loop, the yolk-stalk arising from its apex. The divisions of the intestinal loop are designated cranial and caudal limbs, in description of their relative positions at this period. Jejunum and a part of the ileum are represented in the cranial limb, while the remainder of the ileum and the entire colon arise from the caudal limb. There is, as yet, no generalized increase in the diameter of the segment which is destined to form the colon. However, a cecal process appears on the caudal limb of the loop. It is a local bulging in the wall of the tube, situated on the free (non-mesenterial) border at a point considerably removed from the apex of the loop. The further history of the cecal process will be traced briefly, in accordance with the findings of Kelly and Hurdon.

"At about the seventh week the transverse diameter of the cecal process is no greater than that of the intestine generally; its length may be seven or eight times greater than the width. The elongated cecal process, originally of uniform diameter throughout, shows at eight weeks a beginning differentiation of the appendix and definitive cecum. There is a marked relative narrowing of its distal portion which constitutes the appendix. During the third month the cecum, or wider proximal portion of the cecal process, expands so as to exceed the caliber of the neighboring colon. Later fetal development is characterized by heightening of the size differences between appendix and cecum, although it is not until after birth that an abrupt demarcation between the two is acquired. The cecum attains its asymmetrical form in early postnatal life.

"Most embryos display a transitory distal bud of the cecal process, which apparently takes no part in the formation of the appendix. It is developed in varying degree in different embryos of corresponding age, and is limited in its appearance to the period prior to the separate definition of cecum and appendix.

"Arrests of development in the differentiation of the cecum and appendix may occur at any stage of the process, and the conformations which arise are correspondingly varied. The case of Robinson in which both cecum and appendix are wanting, is an extreme reduction presumably due to an arrest dating from the period of initial development of the normal embryonic cecal process. Less extreme grades of reduction occur as the result of later arrest. In the absence of the appendix the cecum may or may not undergo an independent evolution toward the normal adult form. Dr. Jacobs' Case 1 illustrates a retention of the fetal conformation, comparable at least generically to cases described by Sutton, Chill and Huntington."

ERRORS DUE TO ANATOMICAL ANOMALIES

Usually the length of the appendix, according to various authors, measures from 6 to 12 cm., but appendices as short as 4 mm. (Looten), or as long as 33 cm. (Graur, 1890, quoted by Kelly and Hurdon) have been reported. The organ may be represented only by a little dimple on the cecum, or by a small tubercle. It is possible that such cases may be included among those reported as true agenesis.

The appendix may appear only as a fibrous cord without any trace of pathology to explain this malformation. Monks and

Blacke found in 640 autopsies, 6 cases in which the appendix was represented by such a fibrous cord. The writer has observed two such cases, one in a patient 30 years of age, operated for fibroid uterus. In this instance a thin fibrous cord extended from the cecum near the ileocecal valve to the posterior peritoneal wall. In the second case a young woman was operated for recurrent attacks supposed to be due to a diseased appendix. Exploration showed only a conical bud, about 0.5 cm. long, continued from its tip by a thin fibrous, glistening ribbon about 1 mm. wide attached to the lateral peritoneal wall. Along the course of this ribbon there was a thin peritoneal apron, just as a mesoappendix would be. There were no adhesions.

It is hard to explain this anomaly, but adenoid tissue of the vermiform appendix is as elsewhere most developed in childhood and tends to atrophy in middle life. Coincident with this atrophy there is a tendency (the cause of which is not clear) in the walls to adhere, more or less obliterating the cavity. Piersol quotes Ribbert[1] as reporting that he found in 400 specimens more or less obliteration in 25 per cent, and putting aside those under twenty-five years of age, in 20 per cent. After fifty it occurred in more than 50 per cent. Merling, quoted by Lecompte, collected 2 cases where the appendix was transformed into a sort of ligament. Fleischman has noted it filiform and without a cavity in a portion of its length. The first case cited by the author might fall into the category of the case reported by Merling, and the second corresponds to that reported by Fleischman. Cases of appendices completely obliterated and adherent to the cecum have been reported. The fibrous cord may not resemble the appendix except in such a vague way as to cause a source of error.

The appendix may be arrested in an embryonal state. Clado who studied thoroughly the embryology of the appendix says that at about the tenth week of fetal life the organ is well differentiated. It is possible that from this time on the cecum may continue to grow and that the appendix may be arrested in its development or grow very little. Dailey calls such arrest in development hypoplasia.

Usually the appendix is found in the right iliac fossa, occupying any one of four different positions, the most frequent, it is said, being downward. Next in order of frequency are the internal, the external and the ascending or retrocecal positions. Though the last position is the least frequent, it is well known to exist and may become a source of error. The appendix may occupy various retroperitoneal positions and a minute dissection is necessary to deliver such an appendix. It is possible that some of these cases may fall in the category of those reported as absence of the organ. Kelly and Hurdon have demonstrated the existence of a hidden rudimentary appendix in a case where it was pretended that it did not exist. Francis Dixon found at the dissection table an appendix 16 cm. long, which lay except at its very commencement and termination on the posterior abdominal wall, behind the peritoneum extending to the under surface of the liver. This instance of unusual position is mentioned a propos of the possibility of its being overlooked. A rudimentary appendix may closely simulate the appendices epiploicae and vice versa. A small vermiform process may be concealed from view in the peritoneal folds about the cecum, which are well developed in some instances.

Young in 1911 reported duplication of the appendix, the bases of the two being .06 cm. apart and each having a separate mesoappendix.

Congenital diverticulum of the vermiform appendix was reported by E. Hedinger: "In the distal third of the appendix were numerous outpocketings which either only reached muscularis or extended nearly through it so as to produce an uneven serous surface." Hedinger considers that in his case alone the congenital

[1] *Virchow's Archiv.*, 1893, v, 133.

origin of the diverticulum has been established.

ERRORS DUE TO PATHOLOGICAL ANOMALIES

Dailey points out three pathological causes of error. The appendix may disappear from suppuration or gangrene. All surgeons have noted appendices with more or less destruction from gangrene. This destruction may be complete, later causing the appendix to disappear by absorption, adhesions having intervened to limit the infection. A gangrenous appendix may be expelled through the anus; such cases have been observed several times.

Velyaminov says, "During an acute attack of appendicitis the appendix may become gangrenous, and after becoming detached from the cecum, either falls to pieces in the pus, or, as a foreign body, it can settle in a nest of adhesions between intestinal coils, where it is very difficult or sometimes impossible to recognize its remnants." He quotes Sprengel as mentioning in his book two such cases, and himself saw one case.

In consequence of old inflammation of the peritoneum it is possible to find the appendix encountered by surgeons. Intussusception of the appendix has been cited by Merling as reported by several authors.

Reviewing the cases collected by Merling and quoted by Lecompte, only that of Meckel may be accepted as authentic, inasmuch as it was discovered during the course of a dissection preformed with great care, in which the cecum and adjacent organs were found free from any pathology and no trace of an appendix could be discovered. The reports of the earlier authors could not be accepted in some instances because of the failure to mention whether discovery was made at autopsy or on the operating table, besides lacking convincing details.

Newman Dorland tabulates 35 cases which may be grouped as follows: autopsy and dissection including museum specimens, 17; operation, 11; no mention, 7. Of these 35 cases, 16 only may be classed as true agenesis. Dorland, however, does not include in his table the other two instances of congenital absence of the appendix as seen by Gladstone—one in a fetus and one in a newborn infant. Of the two cases reported by Jacob Michaux from the operating table, in one the author has established in an indubitable manner the congenital absence of the appendix; the authenticity of the other, however, cannot be accepted as above criticism. The remaining descriptions have to do with instances of arrested development, or rudimentary appendices: the case of Roberts (1896) where there was "a dimple-like depression surrounded by peritoneal elevation;" Marshall and Edwards (1906) "a small papular elevation about 6 mm. across and 2 mm. high;" Looten (1908) "a small projection 4 mm. long," reported as a case of almost total absence of appendix; Bird (1911) "small pit in the cecal wall, ½ cm. in diameter."

Lecompte in discussing the reported cases divides them into three groups: first, those where the appendix alone is missing, the cecum normal; second, where the appendix and cecum are absent as the case of Robinson Byron, quoted by Deaver, and of Froelich quoted by Lecompte; third, where the appendix is absent, but the cecum somewhat longer than normal, and the unique case of Schridde, the cecum presenting six haustra.

To these the author would add the case of Morton (1912) in which the entire colon was absent and, second, a personal communication from Dr. Frank Cato, citing a patient with Meckel's diverticulum.

Lecompte remarks that in no one of the reported cases has there been noted the coexistence of another congenital anomaly. Marshall and Edwards in their report say that having searched in vain, they have found no other anomaly; also, Dailey says that a minute examination of the entire abdomen and thorax failed to reveal any other associated anomaly. However, such cases have been reported, as the specimen of Chill in the Museum of the Royal

College of Surgeons cited by Gladstone (congenital absence of appendix concurrent with epicephalocele). In Dr. Cato's case, as given above, the anomaly is accompanied by Meckel's diverticulum. To these there could be added the author's case of a true congenital absence of the appendix associated with a congenital malformation of the uterus and vagina. Possibly a rigorous search of the literature would disclose further examples. Certainly it should be kept in mind that other defects actually existing may easily escape record in reports of appendiceal agenesis whether they are not revealed by inspection of a limited region or, being observed, are not reported in conjunction with the item of primary interest.

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THE RELATIONSHIP OF THE FEMALE SEX HORMONE TO THE ONSET OF LABOR*

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THE cause of the onset of labor has interested obstetricians for centuries. Hippocrates, for instance, supposed that the fetus, actuated by hunger, braced its feet against the fundus and forced its way into the world by its own efforts. Beard in 1897 published his speculations derived from studies in comparative embryology. He believed that the corpus luteum inhibited ovulation. Towards the end of pregnancy the corpus luteum degenerated so as to allow an ovulation at the end of a "critical" period. The preparation for the ovulation brought about parturition, comparable to menstruation when no pregnancy existed. That the question has not been satisfactorily answered is shown by a recent article by Knaus in which he reviews the newer theories and advances one of his own. Stimulated by published reports of the pygopagic Blazek Sisters,[1] Sauerbruck and Heyde in 1910 attempted to demonstrate labor-producing substances in the circulating blood by symbiotic experiments. The next year von der Heide concluded that labor is an anaphylactic phenomenon brought about by a foreign serum of fetal origin. The idea of the origin of the cause of the onset of labor has taken many forms in the past one hundred years. Naegele's belief was that the fetal membranes became detached towards the end of labor and thus acted as a foreign body. Placental infarcts have been thought to act in a similar manner. Many other workers have believed that the biochemical relations of the mother and child were factors, but have been unable to bring forward convincing evidence to support their belief. The number of cases reported by Routh and others, in which normal labor has taken place in paraplegics, proves that the nervous system is not essential to parturition.

The proponents of the endocrine theories as to the onset of labor have centered their attention on the pituitary gland. Dixon and Marshall have shown that the intravenous administration of either pituitary or ovarian extract causes a marked increase in the amount of pituitary extract in the cerobrospinal fluid. No other glandular substance has such effect. They find that the corpus luteum dominates the ovarian metabolism, and that the ovarian secretion which at other times activates the pituitary gland is inhibited or else is neutralized by the secretion coming from the corpus luteum. The withdrawal of this influence, which occurs at the end of pseudopregnancy in the marsupial cat, opossum, dog and rabbit, allows the ovarian secretion to act in its usual manner in activating the pituitary gland. They suggest this as a possible mechanism for bringing about the onset of labor in true pregnancy. Knaus from his work upon the behavior of uterine muscle in various stages of pregnancy and at term, thinks that the cause of the onset of labor lies in the muscle itself, and that it is merely the expression of the physiological maturity of the uterine muscle.

Labor, however, is not simply a series

[1] Basch reports that the non-pregnant sister stopped menstruating two months before term. She presented the same pigmentation of the skin that her sister did and had milk in her breasts.

* Read before the Marlboro County Medical Society, Bennettsville, S. C., January 12, 1928.

of powerful uterine contractions. Any one who has attempted to induce labor much before term knows that there is an added factor, something that softens and makes the cervix more dilatable. I recall a patient at the end of the seventh month who had pre-eclamptic toxemia. A Voorhees bag was readily introduced within the cervix, uterine muscle. Slemons has shown that twenty-four hours before the onset of labor the output of nitrogen by the kidneys is considerably diminished. Zangemeister and Momm have noted a loss of weight in the last three or four days of pregnancy. It is a common clinical observation that there is often an increase in the systolic

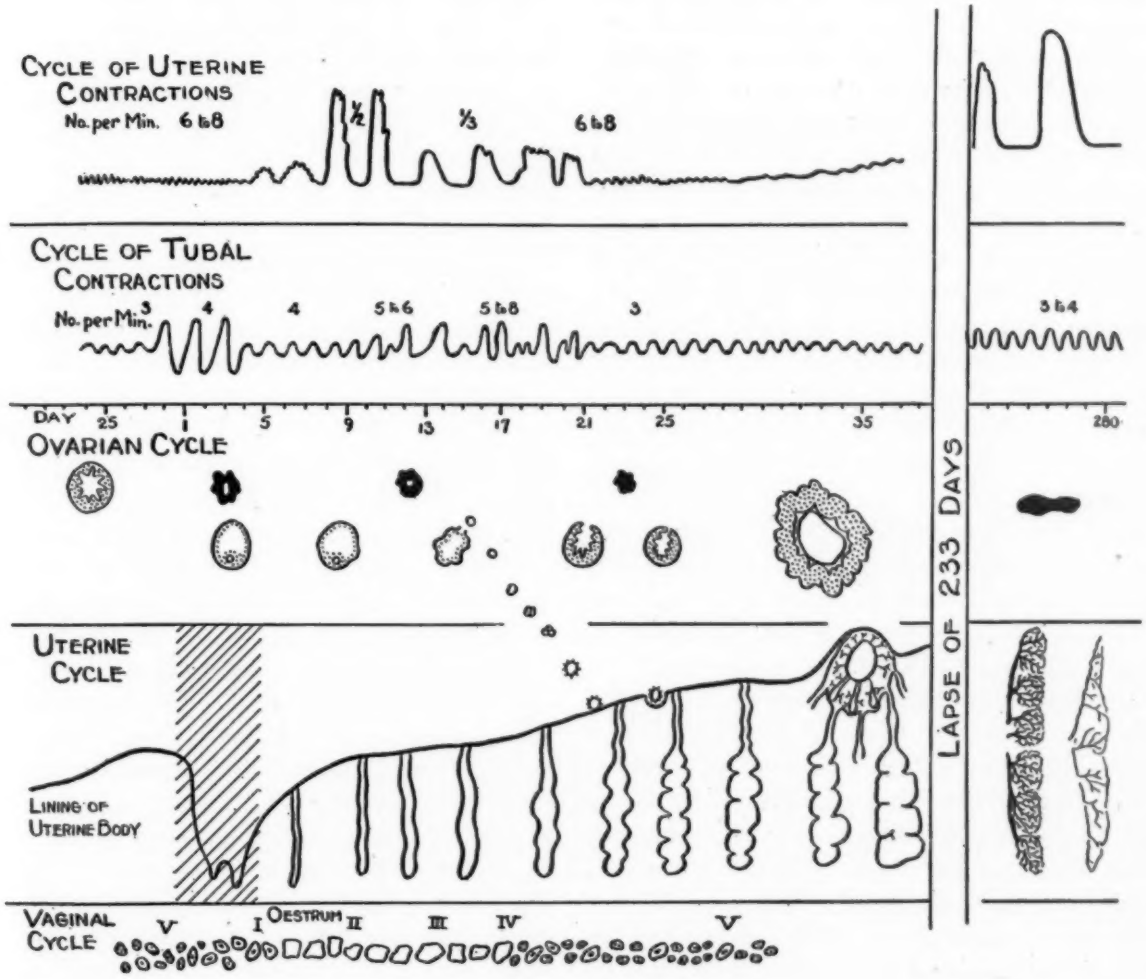

Fig. 1.

and for thirty-six hours this patient had regular uterine contractions of 180 mm. of mercury, which is five or six times harder than the usual first stage contractions. Yet there was no dilatation and she had to be delivered by vaginal cesarian section. Then, too, there are certain prodromal signs of approaching labor that seem too profound to be accounted for by simply a physiological maturity of the blood pressure several days before labor pains begin.

Let us now for a moment review the newer work upon the female sex hormone to see if it throws any light upon the question. It is hard for us to realize that a hundred years ago no connection was seen between the ovaries and menstruation, and the importance of the corpus luteum was hardly dreamed of until Fraenkel's

communication in 1903.[1] Fraenkel destroyed the corpus luteum with a cautery in 9 cases at operation and the patient menstruated within two days. This led him to formulate his theory that the yellow body controls menstruation. Loeb, in the course of some experiments on the artificial production of tumors, found that deciduomata could be readily produced if there were present an active corpus luteum. At such times he was able to actually make a decidua reflex surround a glass bead. He maintained that there was nothing specific in the ovum, that any mechanical stimulus would cause the formation of the decidua if the uterine mucosa were sensitized by the corpus luteum. The relationship of the corpus luteum to the menstrual cycle has been abundantly confirmed by the work of Meyer and Ruge, Marcotty, Schroeder, Halban and Kohler and others, who have approached the subject from every possible angle.

In 1917 Stockard and Papanicolaou published their work correlating vaginal smears in the guinea pig with the histology of the ovum, from which has developed a test for the hormone of the corpus luteum. The histology and physiology of the genital tract at various stages of the growth of the ovum and corpus luteum in the sow have been put on a firm basis by Corner and others. By the use of ovarianectomized animals, chiefly rats and mice, as test objects, Allen and Doisy showed a growth-producing hormone in the theca fluid and the placenta of various animals and in the corpus luteum of human beings. Frank was able to find the substance in corpora lutea of various animals and thought Allen and Doisy's failure to be due to the method they used. It is now quite generally agreed that the function of this hormone is the stimulation of growth, especially of the reproductive system. Beginning with the rupture of the Graafian follicle and later with the activity of the corpus luteum, there is an increased dosage of this substance sufficient to inaugurate and continue tremendous activity, especially in the uterus. If the ovum becomes fertilized, the corpus luteum continues to grow; otherwise retrograde changes take place in the corpus luteum and there is a consequent "house cleaning" in the uterus which we speak of as menstruation. These phenomena are graphically shown in a chart recently published by Dickinson showing the synchronization of the cycle of tubal contractions, the ovarian cycle, the menstrual cycle, and the vaginal cycle. The vaginal cycle in Dickinson's chart is that found in animals. Papanicolaou has attempted to demonstrate the same cyclic changes in the vagina of women but as yet has not been successful. Corner's recently published observations upon apes (macacus rhesus) would seem to show that these cyclic changes are not so simple as was at first thought. He found menstruation, or at least uterine bleeding, to occur at twenty-eight day intervals regardless of whether ovulation occurred or not. If ovulation did occur, it took place at a definite place in the menstrual cycle, and was followed by a characteristic premenstrual hyperplasia of the uterine mucosa. If the ovulation did not occur, there was no hyperplasia but only a uterine bleeding that was indistinguishable from the menstruation that took place when an unfertilized ovum was present. He thinks that there are some clinical facts that point to a similar condition in women. If this be so, there are two kinds of menstrual cycles indistinguishable clinically: one without ovulation and uterine hyperplasia and the other with ovulation and hypertrophy of the uterine mucosa. The Graafian follicle and corpus luteum sequence must be considered a part of a cycle of more fundamental nature, rather than the pace maker of the cycle. Be that as it may, the function of the female sex hormone is

[1] The excellent work of Dalton fifty years ago on the corpus luteum has been buried in the *Transactions of the American Gynecological Society* and seems to have attracted little attention.

pretty definitely determined to be (1) the promotion of growth in the reproductive system as a preparation for the nidation of the fertilized ovum and (2) holding in check the natural emptying power of the uterus. If the ovum is not fertilized, retrograde changes take place in the corpus luteum and the uterus empties itself of the thickened mucosa, a so-called menstrual abortion.

If, however, the ovum be fertilized, the corpus luteum continues to grow, becoming the corpus luteum of pregnancy. Under the influence of increasingly larger doses of the female sex hormone, the uterus continues to grow. The breasts, vagina and tubes also share in the increased vascularity. Later the placenta is formed and takes up the burden of adequate supply of this hormone. Frank has found this hormone constantly in the blood of women shortly before they menstruate. Smith has attempted to show that the amount of hormone increases with the duration of pregnancy, culminating with a marked increase during labor and disappearing entirely within ten hours after labor. Her work is open to criticism in that it is based on only four determinations in labor. The rat unit upon which she relied for the quantitative determination of the hormone in the circulating blood is a variable standard. Coward and Burns have recently shown that this unit of measurement may be subject to as much as 1000 per cent variation.

Bouin and Ancel in 1914 advanced the idea that it is the withdrawal of the hormone furnished by what they call the myometrical gland, which they locate in the placenta, that brings about labor; that the uterus tolerates its growing burden only so long as it is under the influence of this hormone. Frank is convinced of the identity of the hormone found successively in the follicle fluid, in the corpus luteum and in the placenta. He advances the term "gestational gland" for these three structures and the name "female sex hormone" for its secretion.

How does the female sex hormone as an inhibitor of the natural function of the uterus of emptying itself, fit clinically? A theory for the causation of labor to be clinically satisfactory should account for (a) the prodromal signs as well as the actual onset of labor at term, (b) the difference in labor which is induced at or near term, and labor induced prematurely, (c) the difference in a spontaneous abortion and an induced abortion, (d) the symptoms of ectopic pregnancy, (e) the labor pains in abdominal pregnancy and finally, (f) should throw some light upon the treatment of threatened abortion.

THE ONSET OF LABOR AT TERM

A diminution of the growth-producing hormone would easily account for the stationary or declining weight that has been noticed at the end of pregnancy, where the picture is not complicated with edema. The lessened output of nitrogen in the urine and the rise in blood pressure are possible results of a change in endocrine balance. Marshall and Dixon's work shows that the ovarian extract, when not neutralized or inhibited by the corpus luteum, activates the pituitary gland and causes a demonstrable outpouring of pituitary extract into the cerebrospinal fluid. They advance this as a possible cause for the onset of labor. The physiological softening and dilatibility of the cervix, which for want of a better term I have been in the habit of calling ripening of the cervix, is an exaggeration of the premenstrual softening of the cervix and is the first direct evidence that the uterus is preparing to empty itself, as the inhibiting influence of the female sex hormone diminishes. Often there are 2 to 4 cm. dilatation which may be due to pressure of either the presenting part or the "fore waters" on the softened cervix or else to "false" pains. The actual onset of labor may be ushered in by the increased pituitary secretion, brought about in the manner demonstrated by Dixon and Marshall, acting on the physiologically

mature uterine musculature that Knaus has shown to be present at this time.

But what causes the diminution in the amount of female sex hormone? Histologically there is a marked and characteristic thickening of the blood vessel walls in the mature placenta. The beautiful injection experiments of Fraser show the same thing, i.e., that in the mature placenta there are blood vessel changes more marked even than the senile changes in blood vessels elsewhere in the body. It is conceivable, although this has not been proven, that such pronounced changes in structure are accompanied by diminution of function. Such a theory allows a certain amount of variability in the duration of pregnancy. In vicious implantations of the placenta, such as placenta praevia, the tendency to prematurity is brought about by the unfavorable location and by partial detachment of the placenta. The latter factor is the prominent one in ablatio placentae. It is conceivable also that the well-being of the placenta and consequently its hormone production is interfered with to some extent by increased intrauterine pressure, as in the case of hydramnion or multiple pregnancy.

The difference in labor when induced at or near term and labor prematurely induced is marked. When labor is induced at or near term with bags, instrumental dilatation of the cervix is not necessary. Labor pains start within a few hours and dilatation is complete within nine or ten hours as a rule. The induction of labor prematurely is a matter of days, and the introduction of bags must be preceded by instrumental dilatation. The "pains" are slower in starting in the premature uterus, but when once they have started the contractions are just as hard and frequent. They may even be more forceful but they accomplish little as measured by dilatation of the cervix. Very often there is no dilatation until after there is a considerable rise of temperature. Slemons has confirmed the work of Warnekros, who in cases of long labor demonstrated an infection of the placenta as a cause of such fever. It is my own idea that the cervix will not dilate while under the inhibiting influences of the female sex hormone. The rise in temperature is an indication of sufficient damage to the placenta to remove this inhibiting influence.

SPONTANEOUS ABORTION

In striking contrast to the difficulty of inducing premature labor or abortion is the ease with which a spontaneous abortion is accomplished. Many of the early ones are hard to distinguish from ordinary menstruation and even later ones may take place with surprising rapidity and ease. If the ovum dies the uterus cleans out itself as readily as it does at menstruation, but if the ovum be alive and the corpus luteum active the uterus resists to the utmost mechanical or therapeutic efforts. In this connection one should note the experience of veternarians who can produce abortion at will by mechanically rupturing the corpus luteum. Many of the most successful methods of producing abortion are aimed either at the integrity of the corpus luteum early in pregnancy or at the placenta later. It is possible that the abortion of a hydatidiform mole marks the end of the physiological activity of the corpus luteum. There being no placenta to continue the production of the inhibiting hormone, the uterus empties itself as completely as possible.

ECTOPIC PREGNANCY

Whether the ovum be implanted in the uterus or elsewhere, it in some way exerts a beneficial influence upon the corpus luteum. As long as it is alive the corpus luteum grows. When, however, the ovum dies, retrograde changes take place in the corpus luteum and uterine hemorrhage begins. This is an important fact clinically, not only in the diagnosis of the extrauterine pregnancy but also in the diagnosis of the death of the ovum.

ABDOMINAL PREGNANCY

The last time I had the pleasure of reading a paper in South Carolina, I had occasion to mention the work of Dr. John King of Edisto Island. An account of his remarkable case of abdominal pregnancy is reprinted in the November number of the American Journal of Surgery.[1] This patient had been in active labor for several days before Dr. King was called. He was able to deliver a living baby through an incision in the posterior vaginal fornix.

A more usual sequence of events in the cases of abdominal pregnancy that go to term is a period of labor pains, lasting from a few hours to several days, followed by the death of the infant. This to my mind is a clinical expression of what takes place in the placenta. The advancing senility of the placenta causes first a diminished production of female sex hormone with consequent symptoms of labor and finally an inadequacy in its circulation sufficient to cause the death of the fetus. No planned experiment could be better adapted to prove that the cause of the onset of labor does not lie in the physiological maturity of the uterine muscle, or to disprove the Naegele group of theories, i.e. that the fetal membranes or placentae act as a foreign body in the uterus. If von der Heide's theory of anaphylaxis from fetal protein be true, labor should have set in at the time of the tubal abortion in the secondary abdominal cases.

THERAPEUTIC CONCLUSIONS

If this theory of the action of the gestational gland be correct, it gives us an explanation for the frequent efficiency of the hypodermic use of corpus luteum in treatment of threatened abortion. It also emphasizes the desirability, in those cases where it is necessary to induce labor, of carrying the patient as close to term as possible.

CONCLUSIONS

1. That the Graafian follicle, the corpus luteum and the placenta, three structures to which collectively Frank has given the name "gestational gland," produce a hormone that has an important role during pregnancy, is well established.

2. That one of the actions of this hormone is the inhibition of the normal emptying power of the uterus, it matters not what its contents be, seems likely.

3. That a decided lessening of the amount of this hormone in the blood of the mother is the cause of the labor seems to fit clinically with the phenomena observed in labor at term, induced labor, spontaneous and induced abortions, extra-uterine and abdominal pregnancies.

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WIDE AMPUTATION OF THE RECTUM

BY THE COCCYX-PERINEAL ROUTE, IN THE VENTRAL POSITION OF DEPAGE

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IN his report to the 34th French Congress on Surgery in 1925, Ancelme Schwartz, one of the writers on the question of the end results of extirpation of cancer of the rectum writes: "If we visualize the lymphatic propagation of cancers of the rectum, a propagation almost always upwards with the hemorrhoidal plexus as the principal relay; if we visualize the rapid extension of cancer of the rectum by way of the perirectal connective tissue, perhaps very far from the area where the tumor is located; if we visualize, finally, the necessity of tying off the hemorrhoidal vessels far from the rectum and of removing the retrorectal fatty connective tissue layer up to the pelvic wall, one must realize that a purely perineal operation is not scientifically or theoretically a radical operation."

He thus rejected in this report perineal amputation, even if wide, and adopted the combined abdominoperineal operation which was laid out by Queno in 1896.

This was also the opinion of Lecène in 1924. "After all that I have been able to see personally," he said, "operations designed to remove cancer of the rectum must be extremely extensive in order to be efficacious. It is absolutely necessary to remove not only the area of cancerous bowel but also all the mesorectum and mesosigmoid with the glands which they contain. Now, it is scarcely possible to remove these glands solely by the perineal route."

Gordon Watson adds that since he has adopted the perineal method for all the tumors truly rectal, he has been able to operate on older patients, on more advanced cases, and on cases with more risk than he was able to do with the abdominoperineal operation.

Following the same train of thought, Pribam, of Leipzig, rejected the abdominosacral route as very dangerous, exposing the patient to peritoneal infection, to pelvic cellulitis, and to intestinal gangrene.

It has further been noted in checking up that the percentage of permanent cures did not increase by the adoption of the combined route. It is only necessary to remember that the hemorrhoidal group of glands, the extirpation of which is certainly facilitated by the use of the abdominoperineal operation, are always invaded late. The extension of the pathology goes on for a long time in the perirectal cellular tissue, and it is there that most recurrences appear.

When the surgeon operates on a cancer of the rectum he should remove from the pelvis the whole rectal sheath with the rectum; this is the principal maneuver, more important than the excision of the glands of the hilum. Now, astonishing as it may seem at first thought, this maneuver is not simple by the combined route. As Reinhold and Lambert point out, the abdominoperineal operation appears as an incomplete operation so far as removal of the rectal sheath is concerned. The low route only permits of its sure removal.

For several years we have ourselves abandoned the combined route, and have returned to the low route in the majority of cases.

In order that the operation used should

yield good results, the excision must be extensive, especially in width. Once the structure has been removed it should show that one has passed far from the rectum; posteriorly one should find all the fatty retrorectal layer with the branches of the superior hemorrhoidal vessels; in the sides one should see the middle hemorrhoidal vessels tied off far from the rectum. In front the muscular layer of the bowel should be covered over again, first by the peritoneum then by the vaginal wall in the female, and by the prostatoperitoneal fascia in the male.

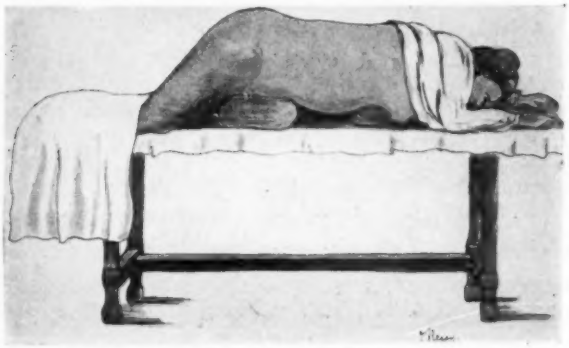

FIG. 1. The ventral position of Depage. Patient lies in ventral position, buttocks raised by a cylindrical bolster placed under the pelvis. The limbs are laid out and fixed at the edge of the table. Under the chest a flat bolster, slightly elevated, is placed. The head rests directly on the table.

How are these results to be obtained by the low route? The simple perineal extirpation (in the classic lithotomy position) limited to the soft parts of the perineum and to the subperitoneal region of the rectum, does not allow complete ablation of the retrorectal layer or access to the hemorrhoidal plexus.

The sacral route with the patient lying on the left side according to Kraske's method, permits a wider excision; most German surgeons employ it with good results. By resection of the bones the whole posterior surface of the rectum is brought into view as well as the three vascular roots and the retrorectal layer of tissue. As H. Steindl believes, the sacral route realizes the principal objects to which a rational method should aspire—easy access to, and free play in the operative field with the aim of a block extirpation of the tumor and its glands. But this route necessitates an extensive resection of the lower part of the sacrum; the operative shock is increased and the gap in the bone may easily become infected.

Since we have given up the combined route we have practiced with success the coccyx-perineal amputation in the ventral position, following the method described by Depage of Brussels in 1901. This method has not the disadvantages of the sacral route. It permits rapid manipulation without much shock. It gives, above all, easy access to the rectal region, which permits complete removal of the rectal and perirectal lesions.

It is evident that the position in which the patients are placed from the beginning of the operation can facilitate the latter singularly. Thus the prognosis of abdominal surgery has certainly been greatly modified from the time Trendelenberg's position has permitted the isolation of the rest of the viscera during operations on the pelvic organs. Similarly, access to the biliary passages is much easier since Wheelock Elliott of Boston thought of putting a block under the thorax of the patient, producing a large exposure of the sub-hepatic space.

In a similar manner Depage thought that the classical lithotomy position was not the best for the extirpation of cancer of the rectum, and he proposed the ventral position.

The patient is placed on his abdomen. The buttocks are elevated by a cylindrical bolster placed under the pelvis; the limbs are laid out and fixed at the edge of the table. Under the chest a flat bolster, slightly elevated, is placed. The head rests directly on the table.

At the time when Depage described it, the ventral position received scarcely any attention from surgeons. Outside of Voelcker and Schlange all remained faithful to the lithotomy position.

In 1898 Jean Louis Faure and Riffel performed the perineal amputation in the lithotomy position. "It is necessary," they

said, "to approach the neoplasm from above, that is to say, beyond its limits, at a point where the tissues are healthy, instead of going from below to reveal the limits of the neoplasm and running the risk of leaving some degenerated portions in the lateral areas or at a higher point. When going from the bottom up one does not know where to stop; one hesitates, one gropes in the dark, one strikes in the dark, and one does only poor work."

With the position of Depage one no longer works at the bottom of a pit but in the open atmosphere. Instead of being concerned with the anterior aspect of the rectum, that is to say, with the dangerous aspect, one approaches immediately the posterior aspect with the retrorectal tissues. Resection of the coccyx completes the exposure and permits, by loosening of the posterior portion of the attachments of the rectum, free access to the posterior and lateral aspects of this organ. The three vascular roots are easily marked out and instead of cutting the same arteries several times in going from below up and from the front back, one clamps them from the start, achieving thus a preliminary hemostasis which makes the rest of the operation much simpler. The work of the assistant is also simplified. One knows how troublesome formerly were the many ligatures at the base of the perineal wound and that at times one had to lift them to permit placing several clamps in the wound. In the ventral position, on the contrary, the vascular roots, which are superficial, are tied without any difficulty. Coming first to the rectum by its posterior aspect permits further the most complete removal of all the retro- and lateroretal sheath which contains the lymphatics and their glands, the first affected. This sheath appears by the resection of the coccyx and it is then quite simple for the operator to remove it with the bowel after sectioning its lateral attachments. The only point in the operation which retains its delicacy is the denudation of the anterior of the rectum in the male in front of the fascia of Denonvilliers, which should be taken away with

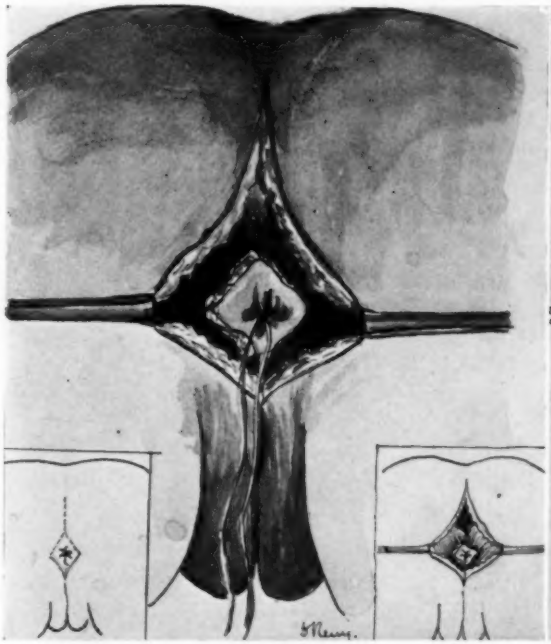

Fig. 2. Second Stage. After purse-string suture of the anus, incision following the outline in the insertion on the left, exposes the connective tissue of the ischiorectal fossa. Resection of the coccyx (insertion on the right).

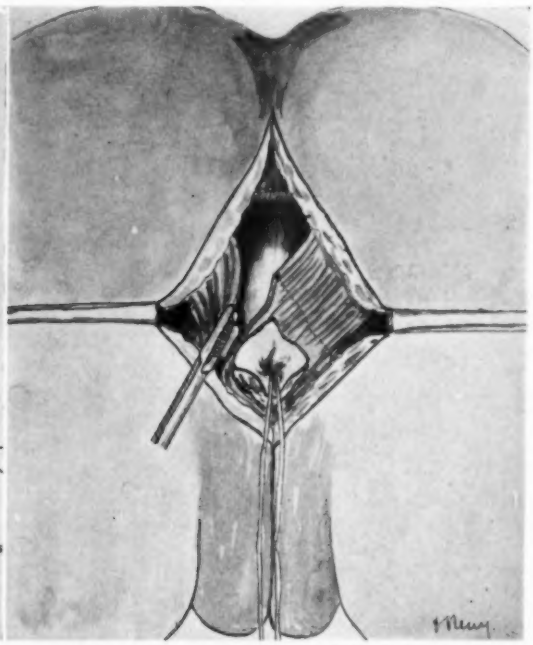

Fig. 3. Posterolateral section of the supports as near as possible to the pelvic wall. (In the drawing this has been done a little too much internally). The rectum appears behind with its connective tissue sheath.

the bowel. This fascia presents a definite barrier between the lymphatic systems of the genitals and the rectum, but between the fascia and the rectum and in contact with the former, there is a compact plexus which constitutes an important avenue of diffusion, as Reinhold has insisted.

From this arises the necessity of incising the prostatic fascia up to the glandular tissue, in a manner to produce by its extirpation a barrier to propagation anteriorly.

The preliminary introduction of a rigid sound into the urethral canal permits simple orientation and permits one to avoid the bulbar cul-de-sac and the prostatic urethra.

An objection to the ventral position has been that it renders difficult general anesthesia. As Depage says, this point should not be exaggerated, and an assistant who is used to the ventral position gives the anesthesia just as well though the head of the patient is turned toward the table.

As for ourselves, we believe that spinal anesthesia is here especially indicated and we employ it with success almost routinely. L. Mummery, also, thinks that the risk of shock is greatly reduced if one gives up general anesthesia with ether or chloroform, for regional or spinal anesthesia.

Before passing to the description of our technique, we shall conclude these considerations by pointing out the gain of time which is possible by the method of Depage. Whereas by the perineal route in the lithotomy position, we take more than an hour to perform an amputation of the rectum, by the coccyx-perineal route in the ventral position our operation does not last more than a half hour.

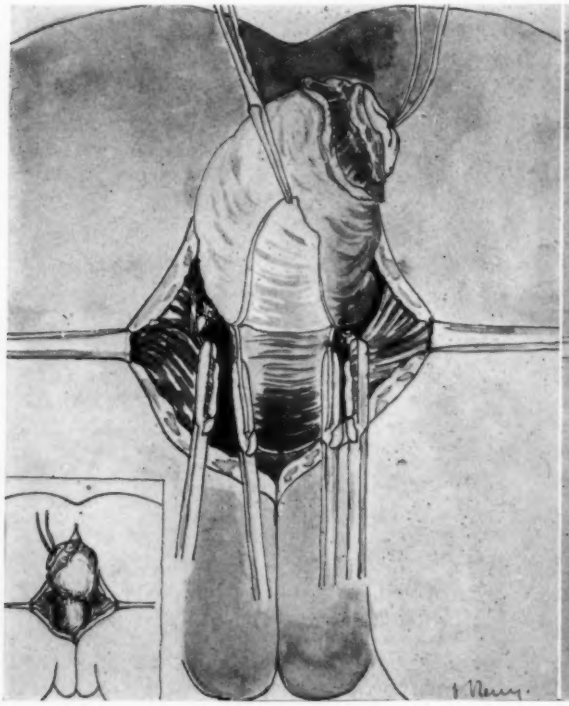

FIG. 4. Third stage. Liberation of the rectum anteriorly. In the insertion, view of the rectovaginal denudation. In the main drawing, the vagina is widely opened and its posterior wall is removed with the rectum.

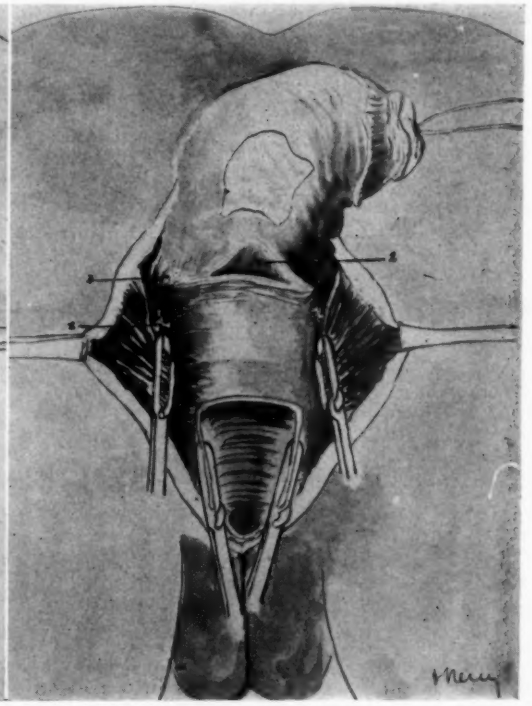

FIG. 5. Fourth and fifth stages. Ligature of the middle hemorrhoidal artery far from the rectum (at 1, the artery tied). Opening of peritoneal cul-de-sac (2). The superior hemorrhoidal arteries appear laterally (3) in the form of cords.

OPERATIVE TECHNIQUE

It appears to us indispensable always to produce an artificial anus, which puts the lower end of the bowel at rest. Further, in

the course of this preliminary operation, an intra-abdominal exploration informs us of the extent of the lesions. The reasons invoked in favor of a perineal anus at La Societe Francaise de Chirurgie in 1920 (Quenu, Duval, Cuneo) are essentially of a sentimental nature. The disadvantages of this form of anus, on the contrary, are real: the danger of contamination of the operative field from the distal end of the colon, secondary incontinence of this perineal anus without preservation of the sphincter, and the great difficulty of keeping clean.

We place the artificial anus in all of our cases in the left iliac region. The procedure is executed with simplicity and rapidity, and thanks to various operative artifices in its method of closure, (Schwartz, 1922; Cuneo and Lambert, 1923), it is from the functional point of view incontestably superior to the perineal anus.

That which the preliminary iliac anus gives above all, as we have said above, is the rest to the diseased rectum. The phenomena of intoxication disappear; the tumor is no longer irritated by the continuous passage of fecal material, and the ichorous and glary discharge often so painful to the patient diminishes and sometimes dries up. The inflammatory processes are limited; the mobility of the neoplasm is increased, especially if to the benefit of the artificial anus are added the mechanical and chemical actions of disinfection by antiseptic lavages.

The Amputation. In general the disinfection of the isolated rectum is satisfactory at the end of 15 days. One takes advantage of this period to build up the general health of the patient (serum, digitalis, vaccine therapy, transfusions in certain cases).

On the day set, we perform a very extensive operation. The following are some essential principles upon which it rests:

(1) Extensive freeing of the rectum with its sheath and all the tissue which surrounds it.

(2) Opening of the peritoneal cul-de-sac.

(3) Removal of the rectum in toto.

This technique is slightly different in the male and in the female. We shall study it first in the male.

Position. This is the ventral position which we have described above. The operator should place himself on the left in such a manner as to make sure the freedom of his right hand; a single assistant is placed opposite the operator.

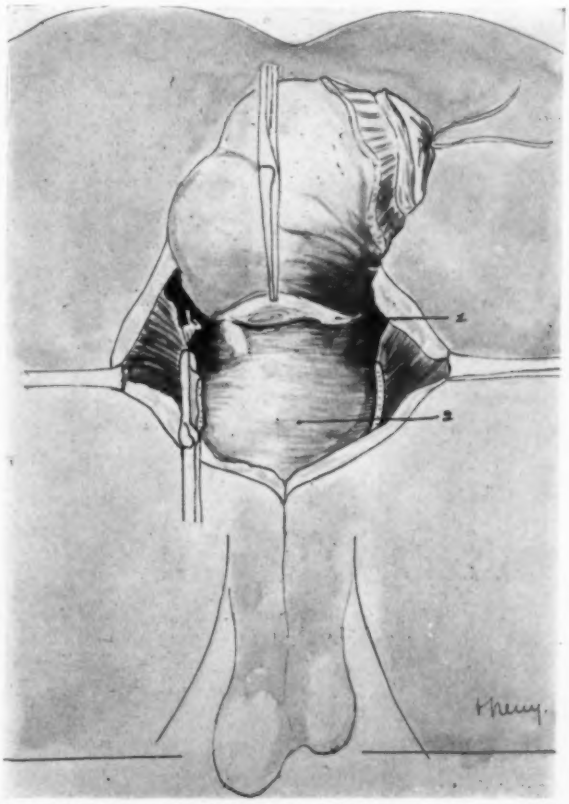

Fig. 6. In the male: Liberation of the rectum anteriorly (different in the male and in the female). After section of the anobulbar raphe one penetrates into the retroprostatic plane of cleavage and one carries away with the rectum the fascia of Denonvilliers. In the bottom of the genitocrural denudation one notes the peritoneal cul-de-sac (1). The prostate covered by the seminal vesicles (2).

First Stage. Purse-string suture of the anus with a thick linen thread is made. A generous bite of the perineal tissue is taken about a centimeter around the anal orifice. In this manner, leaving the thread long enough, one has a firm means of traction, without which one must fear tearing the anus.

Median incision is made extending from the sacrococcygeal articulation to a point two centimeters from the anal orifice. It then divides into two branches which pass around the anus at a distance of two centimeters, and rejoin anteriorly (an anterior incision the length of the anobulbar raphe being most often not needed except in cases of close adherence of the tumor to the bulbar urethra or the prostate).

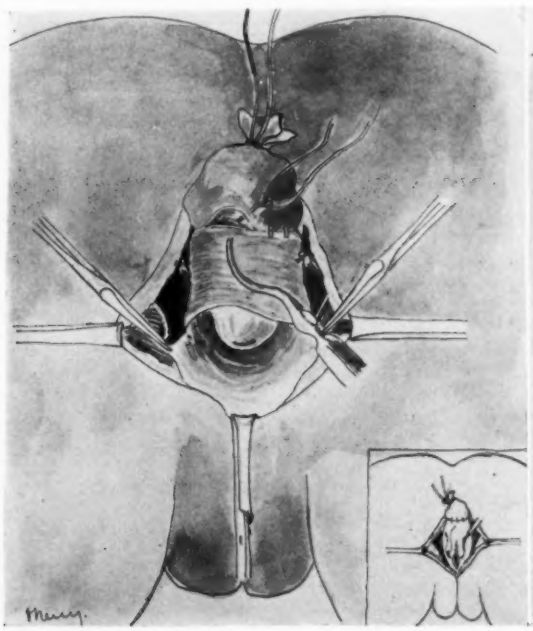

Fig. 7. Seventh stage. Closure of the peritoneal cul-de-sac with fine catgut, and section of the cancerous rectum in toto. In the insertion, suture of the lateral walls of the vagina to fill the gap of the resected posterior wall.

Section of the connective tissue with wide scooping of the two ischiorectal fossae; several ligatures on the arterioles of the region.

Second Stage. Resection of the coccyx and posterolateral section of the rectal supports; liberation of the edge of the coccyx with bistoury and rugine and section at the sacrococcygeal articulation (either with Liston's forceps or with a heavy chisel).

Several fingers are passed via the coccygeal gap into the sacral hollow to denude and liberate the presacral fascia as far off as possible.

Hemostasis of the sacral vessels is obtained either by ligature or tampon. Then with the index finger the rectal supports are attacked, going on each side from behind forward. These are sectioned, keeping as near as possible to the pelvic wall.

Third Stage. Liberation of the rectum anteriorly. The assistant, using traction, lifts the rectum up high. The anobulbar raphe is sectioned carefully to avoid opening the rectum or the urethra. The finger is placed in the retroprostatic plane of cleavage. The prostate is recognized and the fascia of Denonvilliers on it is incised; and one does not hesitate to enter into the glandular parenchyma in order to do this.

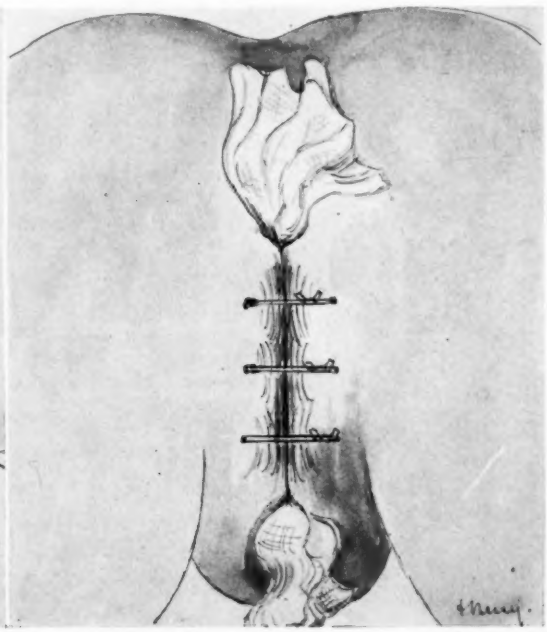

Fig. 8. Eighth stage. Partial suture of the perineal wound, isolating the stump of the bowel by several drains. A vaginal drain.

Fourth Stage. Section of the middle hemorrhoidal artery and liberation of the lateral aspect of the rectum.

The rectum is drawn by the assistant first to the right then to the left to stretch the vascular roots which appear as cords in the midst of the connective tissue coming from the hypogastric area. Ligature and section of the fibrous bundle of the middle hemorrhoidal as far as possible from the rectum, in such a manner as to take in the arterial trunk itself beyond the

accessory branches which go to the rectum.

Fifth Stage. Exposure of the peritoneal cul-de-sac. In bending the rectum upward opposite the sacral gap, the operator finds in the bottom of the genitorectal denudation, the peritoneal cul-de-sac in the form of a whitish sheet. It is carefully incised and picked up with forceps. The abdominal relaxation due to the spinal anesthesia keeps the small loops from entering across the gap. At this time the rectum tends to present itself externally.

Sixth Stage. Section of the superior hemorrhoidals. The mesosigmoid presents plainly; its attachments are cut laterally and posteriorly, and one then notes clearly the cord of the superior hemorrhoidals which is tied and cut as high as possible. At that time the mobility of the rectum is almost complete and nothing opposes its lowering.

Seventh Stage. Closure of the peritoneum with fine catgut sutures from the anterior lip of the cul-de-sac to the anterior aspect of the sigmoid. This stage fixes the sigmoid.

Eighth Stage. Section of the cancerous bowel between two ligatures, at least two finger breadths above the upper limit of the tumor. Fixation of the sigmoidal stump to the skin by several stitches in the middle portion of the incision. Partial suture of the perineal gap, while isolating the stump of the bowel by several wicks which protect the peritoneal cul-de-sac and drain the sacral hollow.

In the Female. The coccyx-perineal amputation in the ventral position is more simple than in the male. The operator need not fear the dangerous zone in the latter formed by the urethral bulb and the prostate. The posterior vaginal wall is actually invaded by the cancer in most cases but it is very easily resected with the rectum. At the end of the operation a useful vaginal canal can be reconstructed from the lateral walls.

INDICATIONS FOR OPERATION

This purely perineal technique does not pretend to be applicable to all cases described under the name of cancer of the rectum. High tumors or intraperitoneal tumors developing at the top of the rectal ampulla and in the rectosigmoid region appear to us without contestation to call for the abdominal route for which we adopt the technique of Hartmann, recommended recently by Soupault. The affected lymphatics in these tumors are in fact lodged in the thickness of the mesosigmoid, as Villemin has shown, and this type of rectal cancer approaches closely to the cancers of the colon.

On the other hand, in all the cancers situated lower down, subperitoneally, our technique appears to us the one of choice. As we have already pointed out, in the actual form of rectal cancer, the lymphatic involvement from the beginning takes in the perirectal connective tissue structures, to which the operation in the position of Depage gives considerable access. The lowering of the colon furthermore allows one to reach the rectosigmoid glands, which however are not involved till late.

OPERATIVE RESULTS

Since 1925, when we adopted the ventral position, we have had occasion to operate on 21 cases of rectal cancer (anorectal region and region of the ampulla) without any operative mortality. The immediate after effects were slight, the shock of little importance. Pain is felt only the few days which follow the operation and the removal of the drains.

We use routinely anti-gangrene serum. We limit ourselves to local daily washings of the wound with Dakin's solution.

The end results are equally good in our 21 cases, a single patient, operated in 1926, dying of generalized carcinomatosis at the beginning of 1927. Three have been lost from view; the others are in good health.

EARLY AND LATE SURGICAL TREATMENT OF CARCINOMA OF THE COLON*

REA SMITH, M.D., F.A.C.S.

LOS ANGELES

THE surgical treatment of tumors of the intestinal tract must of necessity deal largely with carcinoma of the colon. We have, however, both benign and malignant tumors of the small intestine occurring occasionally and necessitating operative treatment on account of obstruction. A polypus or fibroma arising from the lining mucous membrane is often the cause of intussusception. Many times they completely fill the lumen of the small intestine before the symptoms are aggravated enough to call the special attention to any trouble in this region, due to the liquid contents of this section of the bowel. Carcinoma of the small intestine may be either primary or secondary, and is not frequent. However, carcinoma of the small intestine by contact and extension from other tumors in the abdomen are more frequently met. In any case a resection with an end to end anastomosis is the treatment of choice. It is often possible in dealing with an obstruction due to polypus or fibroma to open the intestine, remove the tumor, and close the incision in the bowel without resection. This condition is easily demonstrated at operation by the fact that the obstructing mass inside the intestine is freely movable in its long axis for a distance of from one to two inches. I have on several occasions been able to remove these movable tumors through a longitudinal incision in the intestine, clamping and tieing a small pedicle and closing the incision crosswise to prevent obstruction.

The tumors of the large intestine are more frequent, give very few symptoms until they become obstructive and present a more difficult problem. For consideration of treatment we shall divide the colon into three parts: cecum and ascending colon, including the hepatic flexure; transverse colon, including the splenic flexure; and descending colon. The five years results after excision of carcinoma of the colon are the best in the body, with the exception of carcinoma of the lip. The further to the left we go the better the end results, due to the fact that the further to the left we go in the colon the less absorption takes place and the fewer are the lymphatics subject to metastasis, so that left-sided carcinoma usually remains a local disease and very radical surgery can be performed with a good end result, providing the disease is entirely removed.

The cecum is the absorbing organ of the colon. It has five chains of lymphatic glands following the blood vessel; therefore, any operation on this condition in the ascending colon must be radical enough to remove the lymphatics along the ordinary course of extension. If it is necessary to impair the circulation of the colica dextra just above the cecum, a resection around the hepatic flexure must be done to insure circulation in the anastomosis. While the hepatic flexure sometimes draws its blood supply from the mid-colic artery, it is often supplied by the colica dextra so that a suture line is not safe unless it is well in the circulation of the colic media. If the tumor in the transverse colon is so situated that the mid-colic artery must be tied in order to follow down the lymphatic extension, the splenic flexure must be removed in order to insure blood supply to the stitch line. However, the loop of the mid-colic is so long that it is usually possible to remove a tumor in the transverse colon without endangering any circulation but that con-

* Read before the Los Angeles Surgical Society, March 11, 1927.

cerned with the part of the intestine involved in the tumor.

In carcinoma of the cecum and ascending colon when the diagnosis is made before obstruction takes place, the technic of Mayo right-sided colectomy is the simplest and gives, I think, the best mechanical result. The cecum and ascending colon are mobilized by cutting the outer leaf of the peritoneum. The ascending colon develops a long mesentery and can be turned toward the mid-line. The right ureter, duodenum, and right kidney are exposed and covered with a warm pack. The ileum is clamped not closer than four inches from the ileocecal valve, again to insure circulation to the bowel as the ileocolic artery often supplies the terminal three or four inches of the ileum. The vessels are tied, the mesentery divided around the hepatic flexure, the colon removed with cautery over a Pyer clamp. A running stitch is put in over the Pyer clamp to close the open end and the clamp removed. The female half of a large Murphy button is dropped in the open end and the colon closed by tightening the running stitch. A second row of mattress sutures over the suture line makes it safe. The male half of the Murphy button then is placed in the open end of the terminal ileum with a catgut suture. The button in the colon is brought up against a longitudinal band and let through a small incision and the button snapped together. A few linen and silk Lemberts protect the anastomosis from pull. It is now possible to sew the edge of the mesentery of the ileum to the edge of the mesentery of the transverse colon, and to close in the denuded surface over duodenum and kidney. The advantage of the button over a suture anastomosis, as claimed by Dr. C. H. Mayo, is that it molds the adhesions surrounding the anastomosis and insures a wide lumen.

Tumors in the middle of the transverse colon which can be removed without ligation of the colic media are most easily handled by resection and end to end anastomosis by suture. Ordinarily the blood supply is easily demonstrated, the colon is very mobile, and the abdomen can be easily protected from infection. The aseptic anastomosis of Collins should be particularly applicable to this location. The sigmoid and rectosigmoid junction contains the largest number of carcinoma. When the abdomen is opened and it has been demonstrated by palpating the liver that there is no general metastasis, almost every carcinoma of the descending colon should be considered operable. By cutting the outer leaf of the peritoneum and mobilizing the sigmoid, it is surprising what large masses of carcinoma can be freed in this location. The tubes and ovaries in the female, or back wall of the bladder in the male may be involved. In each case they can be removed with the mass, as also can adherent loops of small intestine, making multiple end to end anastomosis by suture or button. The left ureter may be involved, in which case the involved portion can be resected with the mass and both ends of the ureter ligated without expecting any difficulty from the kidney. When mobilized the question of anastomosis in this location is a more serious one, as the percentage of deaths from a leakage from the eighth to the twelfth day, followed by general peritonitis, is very high in comparison with that for the same procedure by suture that does well in the small intestine or transverse colon. If the tumor is small, particularly if it is situated at the rectosigmoid junction, the artificial intussusception over the tube is easy of performance and is not prone to be followed by secondary leakage. The tube is passed through the open end of the distal part of the colon out of the rectum, the other end back into the open end of the proximal part for several inches; a stitch is put through the proximal edge of the colon and through the tube, tied, and cut. The ends are then brought together by the assistant pulling on the tube from below. A few through and through stitches

connect the two open ends of the bowel. The assistant then makes traction on the tube below, invaginating the anastomosis for about one inch. A row of interrupted Lemberts are placed to prevent the unrolling of the invagination and complete the anastomosis.

If the tumor is higher in the sigmoid and large, the three stage Mikulicz gives by far the best results in spite of the rather distressing convalescence. The two legs of the bowel as far away from the tumor as possible are approximated by Lembert sutures to hold them in contact. The loop of the bowel that contained the tumor is then drawn out of the wound. The peritoneum is attached around the two legs beneath the tumor. It is possible in freeing the tumor to follow down the vessel and remove a large wedge of mesentery with glands attached to the mass. On the second or third day after, the tumor is removed with cautery without anesthetic, leaving in the wound a gun barrel of two open ends of the bowel. About the tenth day an enterotribe is passed into the bowel, one blade into each segment to cut through the spur. This takes from four to five days to cut through by pressure necrosis.

During the process of cutting through, a firm anastomosis by inflammation is established between the two legs of the bowel inside the abdomen. It is imperative to be sure that the spur has been divided well down. It may be necessary to apply the clamp the second time to assure plenty of room when the fistula closes. After the removal of the clamp the colostomy becomes healed. The mucous membrane becomes united to the skin edge, walling off the rest of the wound. At this time, under gas or novocaine, the bowel may be separated from the wall, turned in by suture and the muscle closed over. This third stage is usually followed by fistula, which always heals spontaneously, the bowel edges having been inverted by the suture line.

If complete obstruction has developed before the patient comes to operation, an enterostomy or colostomy will usually have to be done to remove the urgent symptoms before these radical procedures can be attempted, although it is often possible to use the method just described in the sigmoid, lifting the tumor to the outside of the abdomen even in the face of complete obstruction and then relieving the obstruction with the Pahl's tube in the upper segment, either removing the tumor at the same time or leaving it for walling off. Diverticulitis of the sigmoid may simulate carcinoma so that only the microscope will make the diagnosis. It is much more likely to be accompanied by abscess and if not unduly obstructing, the drainage of the abscess will usually take care of the condition without resection. If obstructing, resection as in carcinoma must be done. In my experience the vesicle fecal fistulas have all proven to be diverticulitis and not carcinoma. Carcinoma apparently does not break through into the bladder even if it becomes attached as readily as does the suppurating diverticulitis.

May I add one word about complete obstruction, which has to do with the preparation of the patient for operation? It has been demonstrated rather recently that in complete obstruction the blood chlorides are low. The intravenous administration of the concentrated sodium chloride solution changes the picture of these desperate cases miraculously. It seems to act as an antidote to the toxemia. Vomiting stops, the pulse drops, the vasomotor tone returns and apparently hopeless operative risks may be changed into relatively good risks in a very short space of time by bringing the blood chloride back to normal. This should not, however, lead us to rest in false security because the symptoms have subsided. The abdomen should be opened as soon as the reaction has taken place, for the change to bowel tissue from constriction is not lessened by the salt but still goes on even after the symptoms have temporarily subsided.

SETTING FRACTURES
BY AN ELECTROMOTIVE DEVICE

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NEW YORK

IN the realinement of an overlapping shaft or joint fracture, traction and manipulation is a basic procedure. Traction is either manual or mechanical. It has long been recognized that manual traction is often unsuccessful, and for that reason resort is to mechanical traction best represented by "fracture tables" (immediate traction) or by "straps" (intermediate traction) glued or otherwise fastened to the extremity. Skeletal traction represents another phase of the problem, as does "open reduction" in which direct traction by leverage is employed.

The choice of methods is very largely a matter of personal selection based upon the experience of the surgeon, the type of the fracture, the physique of the patient and the available facilities.

It is conceded that immediate closed reduction is the method of choice in the vast majority of cases. If reduction is made within the first six hours after injury, swelling, spasm of muscle and other complications will be less marked than after this optimum period. Unfortunately, however, a broken bone is not as yet regarded as an emergency requiring the prompt attention given to a broken appendix. For this and other reasons, delay is the rule; we give as our excuse "need for roentgenograms," "fear of secondary swelling" and the like.

Manual traction usually requires anesthesia.

Strap traction means considerable expenditure of time and the use of much apparatus, even in a well equipped hospital. The after care and daily supervision of a case in traction and suspension is of importance.

Skeletal traction and open reduction are of course problems in operative bone surgery. It was long ago recognized that if we had some mechanical device to separate the fragments safely and speedily, some of our difficulties would be solved. Hence from and before the days of Hippocrates, a pulley or windlass device has been employed. Fracture tables are but refinements of this principle. Traction and suspension arose from Buck's extension which in turn was evolved from a plan in use in this country long before the Civil War. The type of apparatus may change but the principle of traction is fundamental.

Recently the writer has been using with success an electric motor device and an appropriate set of traction straps or "harness" for stiff joints. The control in this apparatus is so regulated that a measured pull or thrust is followed by a period of relaxation or rebound. The speed of the motor can be fixed, and the force of the pull can be set and measured in foot pounds, and either increased or decreased by three separate attachments. Realizing that this principle of pull-and-let-go was adapted to the reduction of certain fractures, we tried it out. Below is a report of the initial experience with this contrivance as a fracture reduction method.

H. B. aged thirty, was admitted by ambulance to the Port Hospital January 10th, 1928, at 12 noon. Shortly before this he had been thrown into the hold of a vessel by a swinging load of timber. There was a compound fracture of the lower third of the tibia and fibula (Fig. 1), the wound of puncture type, freely bleeding. Four hours after admission the fracture was partly reduced by manual traction and a plaster of Paris casing applied, a window giving access to the wound. A subsequent roentgenogram showed the adjustment to be incomplete (Fig. 2). Six days later (January 16th, 1928) a four inch encircling cuff was removed from the plaster of Paris casing directly over the fracture

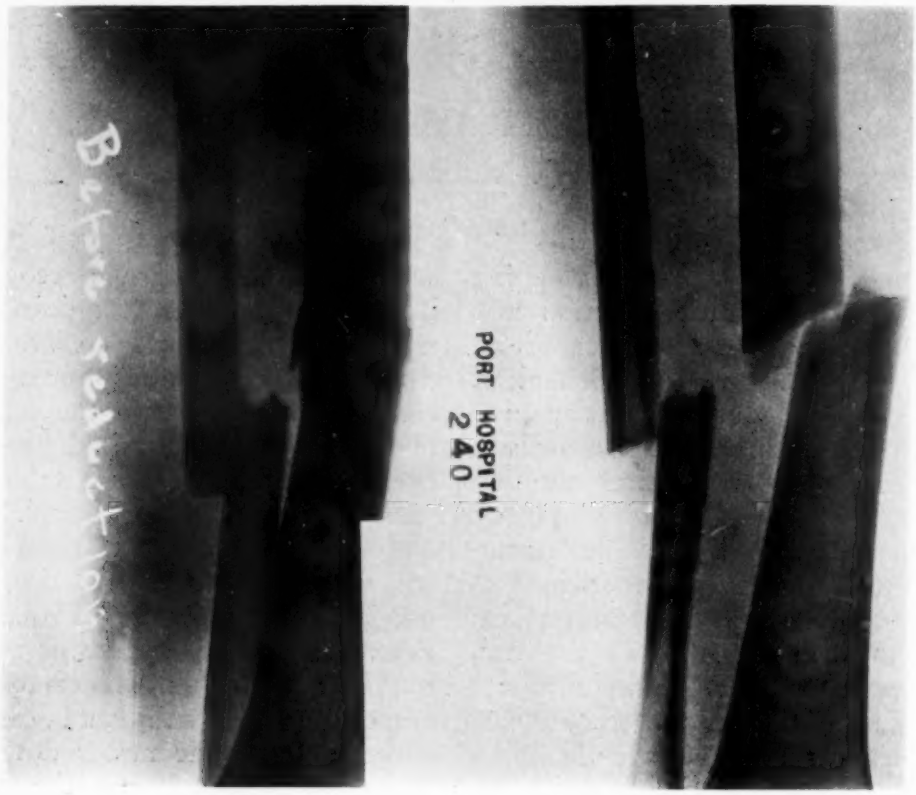


FIG. 1. Fracture of tibia and fibula, before reduction.

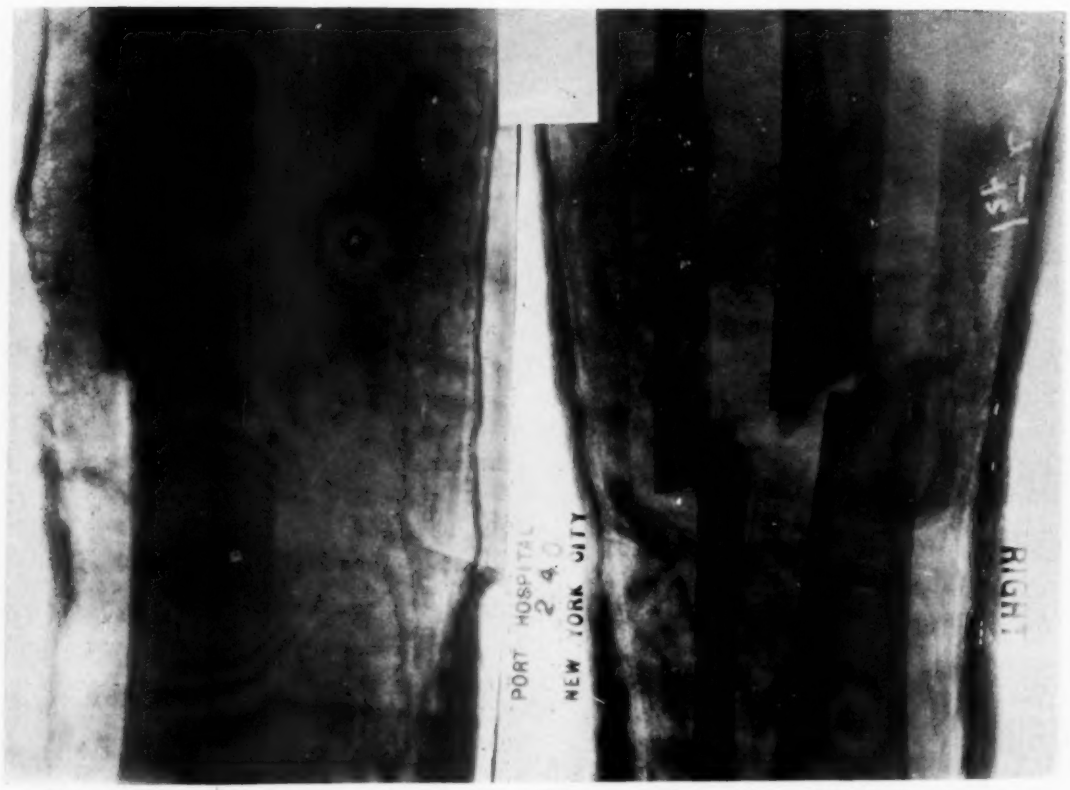
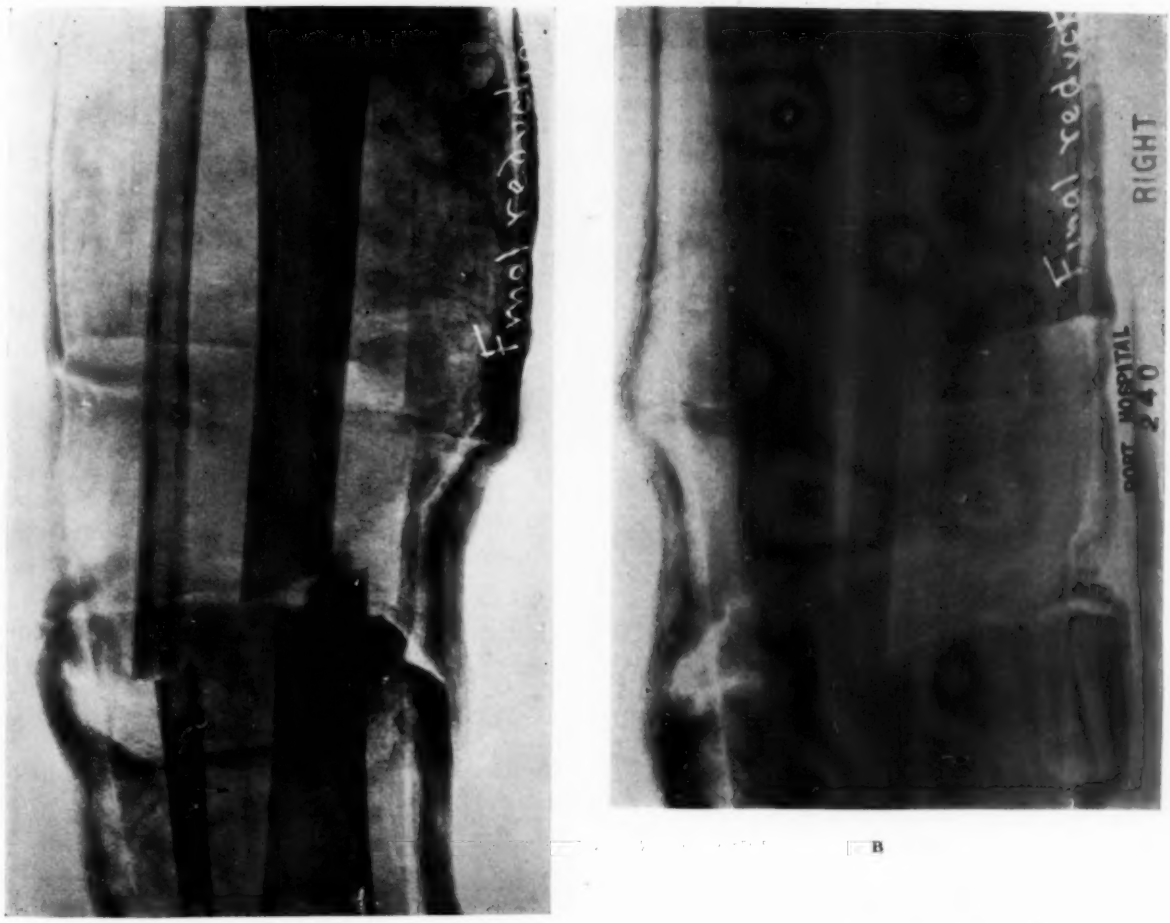


FIG. 2. After manual traction and application of plaster of Paris casing, with window cut out.



A B

Figs. 3A and B. Showing electromotive reduction and end-to-end contact. Note especially the correction of the overlapped fibula and the notching of both bones.

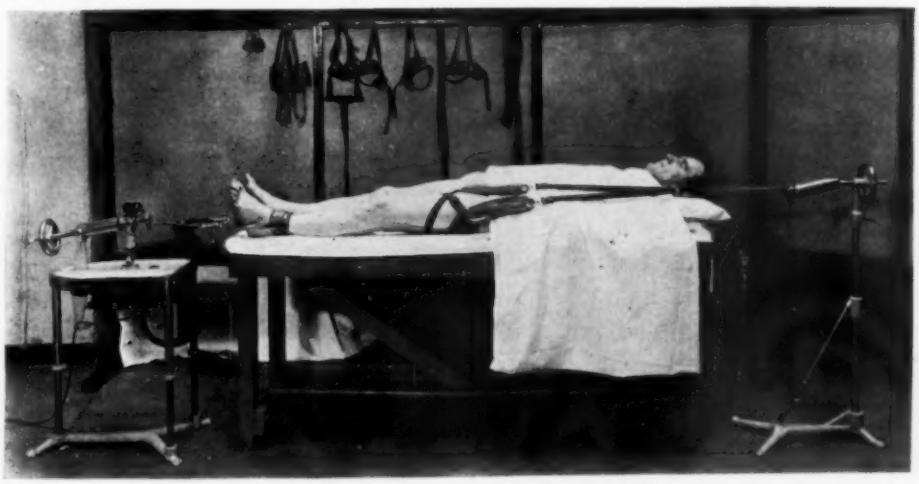


Fig. 4. Electromotor reduction.

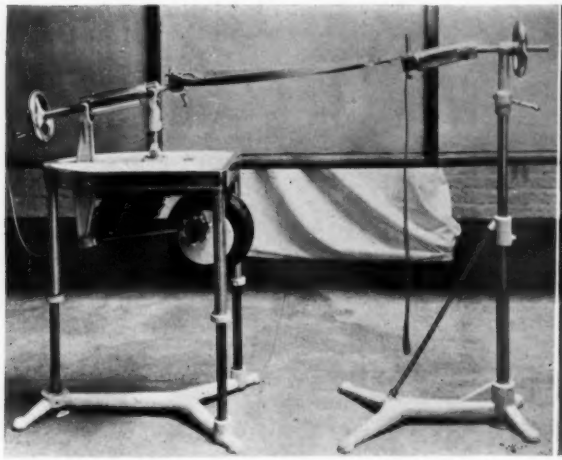


FIG. 5. Showing one side of the motor and two uprights.

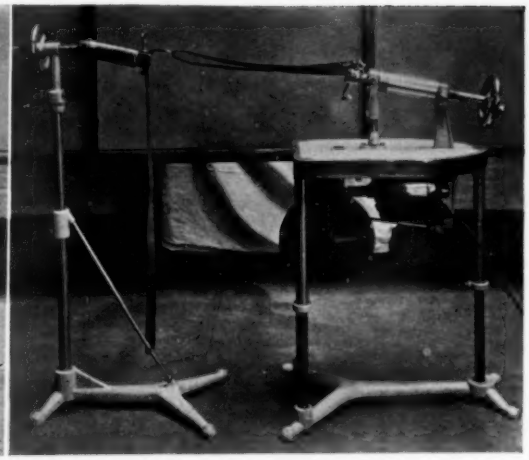


FIG. 6. Showing another side of the motor and the eccentric controlling the rate and extent of the pull-and-let-go mechanism.

site and the healed wound. The harness of the apparatus was fastened about the lower end of the plaster casing, and the counter-pull part of the harness was fastened to the upper thigh. The motor was then started at a slow rate. We were able to observe the gap in the plaster widen and, from the patient's audible comments, had no doubt as to the traction being accomplished. When palpation showed very free false motion and crepitus, we stopped the motor in a period of pull, and thus held the limb in the limit of extension we had attained. This proceeding took but a few moments. The leg was now supported on sandbags (still held in extension by the harness) and the gap in the plaster casing was filled in by plaster of Paris. Immediately a roentgenogram was taken in the corrected position (Fig. 3). Figure 4 shows the attachment as for fracture of the leg. Figures 5 and 6 show details of the device.

If subsequent experience is equally successful, the writer feels convinced that many long bone fractures, now requiring prolonged skeletal traction, can be adequately adjusted by this device. For example, overlapping fractures of the radius and the ulna may be taken out of the operative class thereby. Fracture-dislocations will be especially amenable. Uncomplicated dislocations naturally lend themselves readily to this type of controlled and controllable manipulation. As intimated, the "harness" is adaptable for any part of the body: joints, long bones, fingers, toes, spine, hip and pelvis.

It is not improbable that in the future our reduction will be made on a roentgenographic table so that under the guidance of the fluroscope an exact visual control will be possible.

It is understood of course that this method is only feasible in that large group of cases in which subcutaneous notching is attainable. When, however, the fracture lines are of the smooth or non-serrated, long oblique or transverse types, it is questionable if this or any other immediate traction procedure is applicable. It is realized that when we can obtain and retain end-to-end instead of side-to-side anastomoses of broken bone, we perform the maximum in first stage repair.

This device, based on this initial experience, is worthy of further trial in selected cases, because:

1. It is safe.

2. It permits automatic, regulated, immediate reduction, with or without anesthesia, with or without roentgenographic control.

3. It is adapted to early cases (within the six hour "incubation" period) and to the late or unreduced group, and to some of the group classed by the writer as the "irreducibles" in which prolonged traction, skeletal traction or open reduction has hitherto been the remedy.

4. Because of simplicity and exactitude, it will encourage early reduction and

retention and thus put a larger group at once into the finished class, due to this one act of definitive reduction.

5. A plaster of Paris casing can be applied above and below the fracture site, and this gap can be later filled in after the motor controlled reduction has been obtained. In this way any pressure on the limb can be prevented as the lower end of the "harness" is buckled over the plaster casing and the upper part of the "harness" is distant from the fracture site, acting in effect like a perineal post of a fracture table.

This apparatus is made by the Articulator Company of Detroit, and in a proposed modified portable form the value of the appliance will be enhanced for the purposes above described. In the vicinity of New York it is handled by the Hospital Supply Company.

POINTS IN THE TECHNIQUE OF KIDNEY STONE OPERATIONS*

EDWIN BEER, M.D., F.A.C.S.

NEW YORK

IN kidney stone operations the two most important desiderata are, first, to remove all the stone material, and second, to destroy the kidney parenchyma as little as possible.

In 271 stone operations between 1921 and 1925, I find that in 18 per cent of the cases a nephrectomy was necessary because of the destruction of kidney tissue. In 5 per cent of the cases, owing to the extensive disease of the opposite kidney, or to the fact that the stone was in a solitary kidney, the stones had to be removed without dislocating the organ. In the rest of the series, the operation of choice was a pyelotomy, with or without a small nephrotomy or a wide nephrotomy. In the last 38 personal cases, the same percentage of nephrectomies obtains, but 29 pyelolithotomies were done, and only one wide nephrolithotomy. This very definite swing towards regular pyelolithotomies, with or without small nephrotomies, spares kidney parenchyma, and owing to the cooperation of the roentgenologist, complete removal of all stone material is obtained.

To remove stones by a wide pyelotomy incision which may extend into the adjacent parenchyma, the kidney must be carefully exposed and, if possible, well delivered. Through such a pyelotomy incision with care even the most complicated stones can be delivered. And if the shape of the stone is such that its base or widest portion is near the cortex, such pieces should be removed through a small caliceal incision through the cortex. Before stones are removed the ureter should be carefully constricted with ligatures so that no fragments can fall down into the ureter. After the surgeon feels that he has removed all the stones that can be easily recognized, the kidney is photographed and the film immediately developed. This will show at once whether any fragments have been left behind, which occurs in a good number of cases despite the greatest care and despite the fact that the kidney had been thoroughly irrigated before the pictures were taken.

If the kidney cannot be delivered, it may be necessary to do a nephrotomy to get at the stones. Under these circumstances, we regularly throw a rubber tourniquet around the pedicle, so that the operation is done under complete ischemia. Even these kidneys lend themselves to roentgenography, and in such cases, although it is more difficult to get a complete picture of the undelivered kidney, the information obtained is of value.

In past years we regularly dreaded fragmentation of stone during delivery, but nowadays, with roentgenographic control of the exposed kidney and the immediate development of the films, no such fear of leaving fragments behind oppresses the surgeon. In about 30 cases where the stones were of a complicated shape, the kidneys have been roentgenographed in the operating room, and in about one-half of these fragments were found still present and usually easily located and removed.

*Read before Section of Genito-Urinary Surgery, New York Academy of Medicine, December 21, 1927.

EFFECT OF NEPHROTOMY ON RENAL FUNCTION

INCISION AND SUTURE*

EDWIN BEER, M.D., F.A.C.S.

NEW YORK

ONE of the difficulties in kidney surgery is to decide whether the second kidney is really perfectly adequate. It is well known that a normal secretion can take place from a hypoplastic kidney, and if one removes the other kidney, such a hypoplastic kidney may be inadequate. Geraghty thought that these hypoplastic organs could be recognized preoperatively. Fortunately, in my experience I have never encountered a situation where I had to rely upon such an undeveloped organ following nephrectomy on the other side.

The value, however, of our various tests can be experimentally studied on a kidney that has been nephrotomized and sutured. About a year ago such a nephrotomy was done by me from pole to pole, and closed with a double layer mattress suture as well as hemostatic sutures on the cut surface to control bleeding. This patient has been repeatedly examined since then to determine whether that particular kidney was deprived of any great degree of functional ability by the operation and suture, and much to my surprise the urea percentage concentration, the indigo carmin concentration, and the phenolsulphonephthalein output have been very slightly changed from that of the normal opposite side.

Years ago I noticed that concentrated indigo carmin could be discharged through a lumbar sinus from a small residue of healthy parenchyma which had been accidentally left behind. In the case recently studied, to which I am referring, very similar qualitative as well as quantitative output has been noted. For instance, preoperatively the operated right kidney gave an 0.8 per cent urea as compared to 1.1 per cent on the left side. There was good equal indigo carmin from both sides. About four weeks after a wide hemisection of the right kidney, the indigo carmin on both sides was identical, fairly strong, and the urea on the right was 0.6 per cent, and on the left 0.7 per cent. About a month later, a differential phenolsulphonephthalein test was made on both sides, and the right compared to the left as 45 to 65, a strong concentration being present in both sides. Seven months later a further control showed strong indigo carmin from both sides, with urea on the right side markedly less than on the left, but recontrol three months later showed that the phthalein output was strong in six minutes on both sides. The relation of the right to the left was as four is to seven, and the urea on both sides was 1.2 per cent.

This and similar previous experiences throw considerable doubt upon our ability to determine preoperatively whether we are dealing with a hypoplastic kidney or not.

* Read before Section of Genito-Urinary Surgery, New York Academy of Medicine, Dec. 21, 1927.

THE SURGERY OF PAIN

WITH SPECIAL REFERENCE TO CERVICAL AND LUMBAR GANGLIONECTOMY*

WILLIAM FRANCIS HONAN, M.D., F.A.C.S. AND SAMUEL ALCOTT THOMPSON, M.D.

NEW YORK

BY reason of the great interest in the study of the sympathetic nervous system and its relation to disease, there is a veritable "surgery of pain." (Leriche.)

The splendid results of surgical intervention in the human body at the present time are largely due to complete and accurate studies in physiology. This is particularly true of the subject we now present, the foundation of which was laid years ago by the observations of Gaskell and the subsequent researches of Langley—those brilliant representatives of the Cambridge School of Physiology.

The type of surgery which it is necessary to employ for the relief of pain is somewhat different from that usually indicated. It is easy to relieve a painful peristalsis, a violent and persistent headache or the tension of an infection. But in the variety we speak of, pain is not the only consideration, nor has it always the advantage of a predetermined topography. Pain of disease finds its expression in the nervous system.

The famous experiments of Claude Bernard, published in 1868, in which he demonstrated the mechanism of the vasomotor control of the caliber of the blood vessels by the sympathetic nervous system, were regarded as interesting experiments in physiology until Jaboulay of Lyons in 1889 applied the principle in the decortication of the femoral artery for the cure of perforating ulcer of the foot. His purpose was to destroy the action of the vasoconstrictor control, producing a dilatation with permanent hyperemia of the part supplied by the decorticated artery. In this he was not very successful, but later his associate, Leriche, with a definite and improved technique which he called periarterial sympathectomy, employed it in a variety of conditions of the extremities, such as trophic neuroses, scleroderma, acroasphyxia, Raynaud's disease, causalgia, varicose ulcers, arteriosclerotic gangrene, painful stumps, and other diseases characterized by pain or instability of the peripheral circulation.

Leriche's enthusiastic contributions to medical literature on this subject aroused great interest and the procedure as described by him was performed extensively in Europe and to a certain extent in this country, particularly after his appearance before the Chicago Surgical Society in 1921. It is said that up to the time of his visit to the United States Leriche was not acquainted with Buerger's disease or thromboangitis obliterans.

We were interested in the report of the case operated upon by the late Dr. Albert E. Halstead of Chicago, in which a most excellent result was obtained in a case of endarteritis obliterans. The patient, a postman, had been obliged to resign his position on account of pain and intermittent claudication involving one foot and leg. In a subsequent report of the case in which Halstead described the operation, he considered, after a period of one year, that the patient was entirely cured since he was able satisfactorily to perform the duties of a position which kept him on his feet for a number of hours daily. Halstead in his report considered endarteritis obliterans and throm-

*Read before Section of Surgery, New York Academy of Medicine, November 4, 1927. The lipiodol experiments and the case of angina pectoris have been added since the presentation of the paper.

boangitis obliterans one and the same pathological entity.

Having sufficient clinical material, we performed over two hundred periarterial sympathectomies for a number of conditions due to nerve or circulatory disturbances, or both, with varying results. Most of the patients came to operation for pain, gangrene, ulceration, or a combination of these. During that period our classification was, roughly, endarteritis obliterans or arteriosclerosis, Raynaud's disease, or thromboangitis obliterans. We had been led to believe from the literature at our disposal that the purpose of the decortication was, by severing the sympathetic nerve connection to the arterial coats, to dilate the arterioles by relieving spasm and thereby increase the circulation to the impoverished extremity, and that little or no relief might be expected in the presence of organic vessel pathology. This did not prove to be the case for we found that some of the very best results were obtained in senile gangrene of the feet in which the femoral artery at operation was in a state of such extensive calcareous degeneration as to show through its coat on the removal of its sheath. Calcareous plaques of various sizes could be seen occupying the entire exposed portion of the vessel. No pulse waves could be detected by either touch or sight. Upon removal of the adventitia,

Fig. 1. Fig. 2.

Figs. 1 and 2. Roentgenograms made immediately after injection of 6 c.c. of lipiodol in femoral artery. Anterolateral and lateral views.

however, the artery pulsated vigorously so that its effect could be seen from the seats in the operating theater. This effect was remarkably dramatic and particularly so in those cases in which the calcareous degeneration of the vessel was so advanced that if it was wounded, as happened in three instances, it was impossible, on account of the friability and chalkiness to pass a fine silk suture for the repair of the opening. It was found, however, that the rather free hemorrhage could easily be controlled by the application of bare muscle tissue arranged so as to produce a sufficient amount of equable pressure over the opening.

FIG. 3. FIG. 4.

FIGS. 3 and 4. Roentgenograms made immediately after periarterial sympathetectomy of femoral artery. Anterolateral and lateral views.

At the outset Leriche had stated very decidedly that he had never been able to correlate animal experiments with his clinical results. The vasomotor control of the arteries had always been considered segmental in its distribution. Therefore, how could it be possible to influence the circulation in the foot by a decortication of the femoral artery in Scarpa's space, since there was no evidence of nerve connection between the segmental areas? As a matter of fact, in decortication of the artery an immediate dilatation occurs; this is followed in a few minutes by a contraction which supposedly lasts a few hours to give way to a dilatation which lasts for about two weeks. The contraction occurs only in the decorticated

segment of the artery, it being dilated above and below the denuded area. In favorable cases there will be an increased temperature and hyperemia of the foot corresponding to the operated side. Yet, thus far no demonstrable anatomical studies of nerve distribution have been noted to account for this effect.

in fact, few patients in the wards of the hospital give evidence of a greater degree of suffering than do these. It is astonishing that so little is known of this condition. So thoughtlessly is the pathology estimated that even some physicians expect to see the gangrenous parts restored by periarterial sympathectomy as by a miracle.

Fig. 5. Roentgenogram made immediately after injection of lipiodol in femoral artery. Anterior view.

Fig. 6 Roentgenogram made immediately after periarterial sympathetectomy. Anterior view.

The picture is entirely different in Buerger's disease, for the relief of which we devoted much attention. In this condition there is an occlusive thrombosis of the blood vessels with a migrating phlebitis. Unfortunately the cause, though probably an infection, is not definitely known. Usually when the patients are first seen in out-patient clinics and hospitals, the condition is terminal, without pulse in any artery below the knee and usually with some degree of gangrene in one or more of the toes. The patient has applied for relief of pain and disability; he is unable to walk on account of the pain in the foot and muscles of the calf, causing intermittent claudication. In a short time the pain becomes almost unbearable;

In our early cases of Buerger's disease, many of which had been treated by the introduction of various solutions calculated to diminish the viscosity of the blood, stimulate leucocytosis, relieve pain, etc., we undertook to lower the site of amputation from a point above the knee to the middle of the tibia, and in a few instances periarterial sympathectomy and a guillotine amputation above the gangrenous part relieved pain, apparently increased circulation, and enabled us subsequently to reamputate at a desirable point for the application of a prosthetic apparatus. These cases, however, were too few to justify that technique.

Subsequently our attention was directed to the work of Royle and Hunter in their

contribution to the relief of spastic paralysis. The fact that in their effort to relieve spasticity of muscles in injuries of the brain and spine (as seen more especially resulting from war wounds), it was necessary to discover the opposing elements which produced spasticity and prevented re-education and development of cerebral

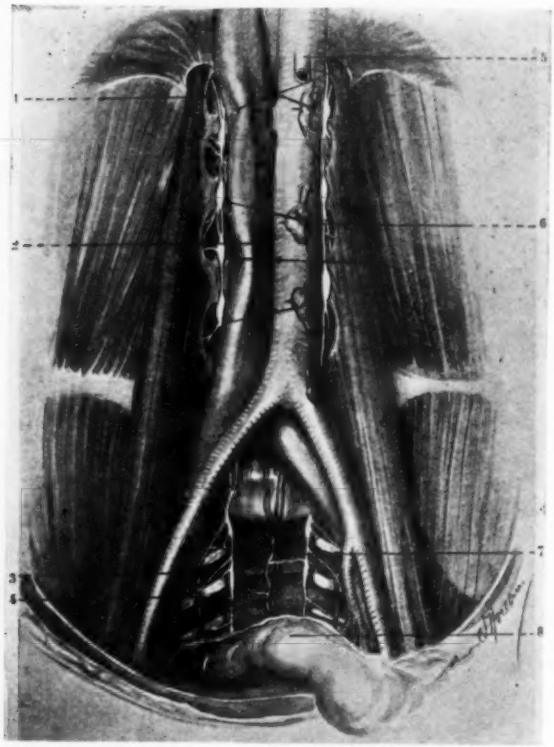


Fig. 7. The lumbosacral chain. Note different situation of lumbar ganglia on right and left sides with relation to the inferior vena cava and the abdominal aorta respectively. 1. Lumber chain at level of first lumbar vertebra. 2. Inferior vena cava. 3. Branch of sacral nerve. 4. Second sacral nerve. 5. Superior mesentery artery. 6. Lymphatic ganglia of latero-aortic chain. 7. Nerve of middle sacral artery. 8. Pelvic colon. (After Bonnait.)

control. Recalling the work of Perroncito in 1901 that each spinal nerve was accompanied by a sympathetic nerve, and after doing a series of animal experiments, they concluded that to relieve spasticity the effects of the sympathetic nerve must be removed. By ramisection of the cervical sympathetic fibers in the neck for spasticity in the upper extremities and division of the rami communicantes in the lumbosacral region for similar conditions in the lower extremities, it was possible then to re-educate paralyzed patients with remarkable restoration of function. It was also noted that following ramisection there was hyperemia and elevation of surface temperature in the limb corresponding to the operated side, and from the study of their results we decided to attempt the same operation for conditions for which we had previously employed periarterial sympathectomy of the larger arteries of the upper and lower extremities. We made use of the experiences of Knavel and Davis of Chicago, and Adson of Rochester, Minnesota.

Though our experiences have been somewhat limited, the results have been so striking that we believe they open up a field for surgical endeavor in which the results may prove unquestionably brilliant in carefully selected cases. The real criterion of the propriety of employing any surgical procedure is to establish a correct diagnosis and properly to estimate the extent of the pathological process, realizing that when the case is in a terminal stage and the presence of molecular death is obvious, ablation of the offending part must be made in an area sufficiently viable to offer relief from pain, which is a good index to the success of the operation, and to promote normal healing and give satisfactory postoperative function of the limb.

Our first attempt at relieving distress by cervical sympathectomy was in a condition resulting from exposure to cold, with obstruction of circulation in both hands. This patient, a healthy man about forty-two years of age, presented the following history:

Case 1. J. B., admitted February 18, 1927, complaining of frozen fingers of both hands with pain and disability. Several weeks previous to admission patient had both hands exposed to snow and rain while he was unconscious. The fingers became numb and stiff, later swelling and contracting and the nails dropped off. Past personal and family history irrelevant. Occupation, barber.

Physical examination revealed no pathology except of both hands. The fingers of both hands were flexed and swollen and fixed, resembling claw hands. Fingers very tender to touch. Finger nails absent and skin of fingers peeling off in spots. Radial pulsation present in both wrists. Wassermann negative. Diagnosis, frost bite of both hands.

Operation, March 3, 1927. A right cervical ganglionectomy was performed under ether anesthesia. Operative procedure consisted in making an incision extending from angle of right jaw along sternomastoid border to clavicle with a hockey stick prolongation above clavicle to right. Sternomastoid muscle and carotid sheath displaced outward and the sympathetic chain identified. The middle inferior stellate ganglion on right side removed by avulsion. Layer closure of wound.

Progress. Immediate postoperative convalescence good. The second postoperative day he stated that he had less pain in fingers of both hands, more marked in the left, and the function was greatly improved. The fingers and hands continued to improve and three weeks after operation massage and baking had so improved the flexion of the joints that patient was able to pick up small objects with his fingers. Sensation fully returned and patient was discharged April 4, 1927, with about 60 per cent function of both hands.

It was suggested that relief, particularly on the left side, was purely psychic and had no bearing upon the operative procedure, but in opposition to this theory, the bilateral action of removal of the sympathetic ganglia had been previously reported by Leriche. The improvement, however, was very satisfactory, being supplemented by massage and other physical therapy which, following the operation, was well tolerated though previously the slightest touch on the fingers produced an effect not unlike a mild electric shock. Subsequent to the operation there was a slight degree of Horner's syndrome which gradually improved. With some difficulty the patient was persuaded to remain in the hospital for a month in order that he might be kept under observation and treatment. A month later a letter was received from him expressing deep gratitude and stating that he had returned to his work as a barber and considered himself perfectly well.

Case II. M. M., a worker in a rubber factory, aged fifty-five and single, was admitted to the Hospital on February 14, 1927, complaining of ulcers on both feet and inability to walk on account of pain and swelling of the feet. His illness began about one year previous to admission, with the development of two small ulcers on the dorsum of the right foot. Soon after the ulcers appeared the great toe of the left foot became infected. He had had varicose veins in both legs for thirty years, with slight swelling of both feet for several years.

Fig. 8. Front and lateral views of neck cervical ganglionectomy for frozen and contracted fingers.

He denied any venereal infection. He had had no diseases of childhood, but remembered malaria twenty-five years previously, and a compound fracture of the right femur fifteen years previously. His family history was negative.

Examination of the head, neck, chest, abdomen, genitals and rectum were essentially negative for pathology. The lower extremities presented a slight degree of varicosity of the superficial veins. Both feet were slightly edematous. The left great toe showed a chronic paronychia. On the plantar surface of the right foot at the base of the great toe was a small punched-out non-purulent, unclean ulcer about the size of a ten-cent piece, with a similar ulcer at the head of the fourth metatarsal, and an inflammatory reaction at the distal end of the second toe. The skin of both feet was much thickened, dry and scaly. The toe nails were thickened and somewhat deformed. Pulsation was present in the anterior tibial, posterior tibial, dorsalis pedis and popliteal arteries, and was equal on both sides. The Wassermann test was negative.

Diagnosis. (1) Polyarthritis of both feet; (2) varicose veins of both legs; (3) trophic ulcers of the right foot.

Operation. A bilateral lumbar ganglionec-

tomy was performed under ether anesthesia on March 3, 1927. The procedure consisted of a midline abdominal incision about three inches above and three inches below the umbilicus. The intestines were displaced upward and packed off. The incision was through the posterior parietal peritoneum along the lateral border of the abdominal aorta about 4 in. long. The second and third lumbar ganglia on the left side were identified and removed by avulsion. The posterior peritoneum was stripped off from the abdominal vena cava which was displaced slightly to the left, and the portion of the duodenum was identified. The second, third and fourth lumbar ganglia of the right side were identified and removed by avulsion. The posterior peritoneum was closed with interrupted catgut sutures and a layer closure of the anterior abdominal wall was made.

Convalescence was rather stormy but with a gradual reduction of the edema and increased warmth of feet and legs. The trophic ulcers were healed about five weeks after operation, as was also the infection of the left great toe. The patient was discharged as cured, May 3, 1927.

Case III. T. B., aged forty-five, suffered severely from angina pectoris, often having several attacks in twenty-four hours, with diminishing relief from amyl nitrite and nitroglycerine. His heart was somewhat enlarged. Physical examination by internist did not show any very definite organic lesion, although the patient had suffered from dyspnea on exertion.

Purely for the purpose of relieving pain a cervical sympathectomy was done on the left side under local anesthesia. The middle inferior cervical ganglia with the cervical branches of the stellate were removed also. Relief from pain was prompt and no measures were required for cardiac distress.

Fig. 9. Fig. 10.

Figs. 9 and 10. Cervical ganglionectomy for angina pectoris.

Two months later the patient was discharged from the hospital. The dyspnea had improved and he had not had even a suspicion of angina.

A discussion of the operative procedures for angina pectoris is a very large subject in itself and few surgeons agree on just which ganglia should be removed, to say nothing of the indications for the operation and the extent to which it is justifiable. A single case is no criterion, but our purpose was to relieve severe pain and that object was very definitely accomplished.

Thus began our experiences with cervical and lumbar ganglionectomy and although this is merely a preliminary report of a few cases, we are convinced with Leriche that there exists today a "surgery of pain," and we shall quote extensively from his contributions on the subject.

The object is to afford relief to those who suffer from painful syndromes of

unknown origin, in which pain is the outstanding feature and which ordinary surgery has failed to relieve. Another group of incurable conditions are cancer and tabes which carry with them frightful suffering. When a chronic painful condition is present in a patient of which there is no hope of a spontaneous cure, surgical intervention should immediately be considered.

The disease finds itself expressed in the nervous system. The anatomical direction of pain is complicated by a long course of which nothing is specific. The excitation which is the cause can originate anywhere—at the periphery, at the center or from trivial causes. The topography in which it presents itself does not always show clear indications of its possible origin. Its different expressions do not tell anything of the mechanism of its production. Furthermore, the condition is frequently colored by the psychology of the patient and such a fact has no diagnostic value.

There are two main types of pain, cerebrospinal and that of the sympathetic system. The first follows an expression of classical anatomical topography, always identical, and does not depart from a territory of a given innervation. The area is fixed, without radiation and it cannot at once reach all of the branches of the stricken nerve but if it extends it must do so by the regular and known anatomical distribution. It is not continuous. Without any apparent reason it ceases abruptly and relief is complete until the next attack. Neuralgia of the trigeminal is a characteristic example of this phenomenon.

Pain of the sympathetic system is unstable, less circumscribed and distributed less systematically. It radiates continually into new territories. It may gradually extend and go from side to side. It is aggravated by all of the emotions, aggravated by violent disturbances and noises, and influenced in a degree by atmospheric charges which we do not understand.

Operations undertaken for the relief of pain should not be dangerous to life nor should they expose the patient to the risk of an infirmity.

The operation for trigeminal neuralgia is a triumph of surgical intervention for pain. When the pain is located in the territory of the distribution of the fifth pair, the pain being of an intermittent character and diagnosed as the characteristics of trigeminal neuralgia, section of the postsensory root of the Gasserian ganglion will almost surely cure. Such cure has been abundantly proven since this procedure is one of the older surgical invasions of the sympathetic ganglia, and at the present time represents a satisfactory evolution from Hartley and Krause to Frazier and others. If the pain is continuous, and not limited to the exact distribution of the trigeminal, one usually says the pain is of sympathetic origin and retrogasserian neurotomy is contraindicated, as the procedure always fails.

We have operated for angina pectoris only once and since we have demonstrated the ease with which it can be done, we would strongly recommend the more general employment of this procedure. Given a fairly good myocardium and the employment of local anesthesia, the operation is quite justifiable and leads to most excellent results in prolonging life and usefulness with complete relief of the angina.

The literature of various countries abounds in cases operated upon with varying results, indicating that this operation will be performed more and more.

Theoretically, Raynaud's disease should have been best influenced by periarterial sympathectomy but our results have not been very satisfactory, as our cases were distinctly terminal. This disease appears in many clinical forms, and lack of knowledge of the mechanism of its production in all cases has not permitted exact conclusions. Our cases suffering from the effects of cold seemed to be atypical Raynaud's disease, being bilateral due to peripheral nerve

injuries and attended with trophic changes. They probably came under the classification of what Leriche termed "an ascending neuritis." In a number of instances Leriche and others report lasting cures by bilateral sympathectomy, some of them extending over a period of ten years. Other conditions were found, such as causalgia, a neuritis of the sympathetic nerve following injuries, civil or military. If the disease was not far advanced, periarterial sympathectomy with excision of the cicatrices was generally successful.

The next case illustrates lumbar ganglionectomy in an early case of Buerger's disease.

Case IV. D. H., aged thirty-four, a Russian by birth who had been in America fifteen years, gave an unimportant family history. About seven years previously he had had the left leg amputated for what would seem, from the history given, to have been Buerger's disease. In February, 1927, he began to have pain in the calf of the right leg, extending to the foot. He was admitted to the Fifth Avenue Hospital, July 2nd, 1927, with typical thromboangitis obliterans, with rubor when in dependent position and syncope on elevation of the leg. The second toe was infected, the nail came off, and ulceration extended upward to the metatarsophalangeal joint. No pulse below the popliteal region.

On July 21, 1927, a right lumbar ganglionectomy was performed and an unusually smooth convalescence followed. The foot and leg became warmer and rubor practically disappeared. The oscillometric index improved, and since his recovery from the anesthetic he has had no further pain or inconvenience to date, March 15th, 1928.

Lumbar ganglionectomy is indicated for abdominal pain following gastric, gallbladder, bile-duct, and liver operations made through possible error in diagnosis and in which the patient is not relieved of pain. It may also be useful in visceral and pelvic neuralgias.

We are quite convinced that the better results following partial gastrectomy rather than gastroenterostomy in pre- and postpyloric ulcer, may be due in large part not only to the removal of pathological tissue, but to the section of the sympathetic nerve innervation of the pyloric antrum and first portion of the duodenum.

In gynecologic conditions Leriche considers that sympathectomy has made its greatest progress. Section of the presacral nerve will relieve many painful pelvic conditions. It is also highly probable that sympathectomy or ganglionectomy, or both, will ameliorate the pain of inoperable or recurrent carcinoma of the uterus. This will also give opportunity, upon abdominal section, to relieve any other complication, such as obstructed ureter or intestine, and, if successful, will spare the patient a long period of morphinism with its distresses, which close the picture of malignancy.

Oppel, who classified all cases under "spontaneous gangrene," believed it to be the local expression of a hyperadrenalinemia, an arteriosis suprarenalis of the extremities, producing desquamation of the endothelium, degeneration of the muscular coat with thrombosis. He and his assistant seemed to demonstrate that the gangrenes had an excess of adrenalin in the blood serum which produced spasm of the arterioles, and that also hyperglycemia was present. Furthermore, there was a hyperthrombocytosis, a tendency to hyperglobinuria, increased viscosity of the blood with final coagulation.

For this condition he performed left suprarenalectomy in about 115 cases, leaving a small bit of the gland in situ. After operation he reports a fall in the systolic and diastolic blood pressures but a rise in the peripheral pressure of patients due to pressure. The blood pressure remained low and is not to be explained by the effect of the anesthesia or shock. The blood sugar became normal and there was a fall in the thrombocytes. He described other proteid animines which are also vasoconstrictors. Basedow's and Addison's diseases showed normal adrenalin in the blood but it was definitely increased in Reynaud's disease. Oppel's work

attracted much attention but a study of the final result of a large number of surrenalectomies done in Russia and elsewhere showed that most of the cases had come to amputation, and those supposedly cured were almost negligible. This is most unfortunate for the hypothesis seemed tenable and the operation fairly safe.

Angina pectoris offers a very interesting field for sympathetic nerve surgery but presents some difficulties at present because of the lack of unanimity on the part of surgeons as to just which nerves should be ablated and what type of disease is amenable to operation. The stellate ganglion, which is a fusion of the branches of the inferior cervical ganglion and the first dorsal of the sympathetic, is the great central station of the aorta and heart innervation, but its bilateral removal, as has been recommended, is associated with danger of pulmonary edema and other complications.

The removal of the superior ganglion, practiced by Jonnesco and later by Coffey and Brien, is not thought necessary by Leriche, Danielopolu and others. We have achieved results in two cases without its removal, and confine ourselves to ablating the so-called sensory fibres which are connected with the middle inferior and stellate ganglia. The best cardiologists differentiate between angina pectoris and coronary thrombosis, and we suggest operative relief for the condition, described by Albutt and later emphasized by Alexander Lambert, of a substernal lancinating, more or less radiating, pain, in contradistinction to the epigastric pain of coronary thrombosis often mistaken and operated upon for gastric ulcer.

To relieve the pain of coronary thrombosis by surgery is comparable to the attempt to relieve Buerger's disease with gangrene in a similar way. The comparison may be crude; both present advanced arterial disease with occlusive thrombosis, the former with an ischemic heart muscle and the latter with gangrene—both terminal expressions of perhaps a similar pathology.

In order to determine what actually occurs after femoral sympathectomy, we exposed the femoral artery in Scarpa's triangle and injected 6 c.c. of lipiodol into the lumen of the vessel. Slight traction was made upon the artery and roentgen-ray exposures were made in the region of the knee, the leg, and the foot. A sympathectomy was then performed on the femoral artery and an immediate series of roentgen-ray exposures was made of exactly the same regions with the leg in the same position. The results are shown in Figures 1, 2, 3, 4, 5, 6, 7. These exposures must be made immediately, as contraction occurs within a short period after decortication.

If a quick guillotine amputation is made, there will be a slight oozing from the soft tissues but by the time the sympathectomy is complete one is obliged, in favorable cases, to ligate two to four spurting arteries in the leg. Most of our observations have been made upon the lower extremities, using the femoral artery, though approximately the same results are seen in the upper limbs. While we have met with many failures in decortication of the brachial artery, the operations being frequently undertaken in cases in which there was scarcely any hope of relief due to the advanced state of the disease, no harm apparently was done as the fatalities were only in cases of late diabetic gangrene. We feel justified in continuing our efforts, particularly in cases suitable for cervical or lumbar ganglionectomy.

DISCUSSION

Dr. Leo Buerger. Drs. Honan and Thompson have made it very clear that they are doing these operations for that disconcerting symptom of the disease, pain. Some of these procedures have fallen into disrepute because of the exaggerated conclusions reached as to their influence on the disease *per se*, whereas Drs. Honan and Thompson have been careful

to adjudge their restrictions as well as their benefits. For years I have pointed out that in circulatory disturbances of the extremities this phenomenon of pain is not produced by any one single factor but by a number of forces. One of these was alluded to in the reference to the importance of removing gangrenous parts. Indeed, ulcers, trophic disturbances, gangrenous areas may be directly responsible for severe pain. But there are other types of pain whose paths reside in the sympathetic nervous system and some of these we can hope to alleviate.

We are dealing with a complicated nervous and arterial mechanism in which not only the large and small arteries but also collateral circulation play a role. Vasomotor innervation may be disturbed not only by fibrosclerotic changes in the nerves accompanying the arteries but also to reflexes. We can hope for some alleviation of symptoms by interference with the vegetative nervous paths in an anatomic way. Further proof of this possibility is to be found in the fact that if we interfere with the vegetative nervous system by operation we get changes in the surface temperature. Indeed, even in organic disease of the vessels, this vasomotor mechanism may be disturbed and we may observe vasomotor constriction over certain areas of the foot independent of the obturation of the larger arteries, and it is this malfunction that may be improved through the operation suggested. Often the surface temperature is improved thereby, which may explain some of the remarkable effects Dr. Honan and Dr. Thompson have obtained.

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THE VICTOR EMMANUEL III NATIONAL INSTITUTE FOR THE STUDY AND TREATMENT OF CANCER, MILAN, ITALY*

GAETANO FICHERA, M.D.

MILAN

FOR some time there has been a need in Italy for an organized national warfare against cancer such as has been carried on in other progressive nations. Previous attempts to bring about an organization of this kind had been made by a committee headed by Senator Golgi, who enlisted the cooperation of Senator Lustig and Mr. Frisoni, as well as that of the Red Cross and the National League against Cancer. But the happy decision to build what is today the most conspicuous and complete institution of its kind in the world resulted from the work of Professor Luigi Mangiagalli who, as Mayor of Milan, started an appeal for such a foundation. Wishing to honor the King on the twenty-fifth anniversary of his reign, he named this foundation L'Istituto Nazionale Vittorio Emanuele III.

FIG. 1. Victor Emmanuel III National Institute for Cancer, Milan. General view, July, 1927.

In a few months ten million lire were subscribed, including the contributions of the city of Milan, the Savings Bank, the Commercial Bank, the Sierotherapeutic Institute of Milan and the Italian colony of Sao Paolo, Brazil. In the spring of 1925 the King inaugurated the construction and in less than two years the work was finished. The plans were drawn by Mr. Monticelli and the buildings were constructed under the direction of Mr. Ferrini, the engineer.

The six buildings cover a space of 12,000 square meters and are connected by underground passages and galleries. In the structure facing Via Strambio are found the president's office, the administration offices, rooms of the physicians, the library, the statistical department, the pathological section, the biochemical experimental laboratories and the office of the periodical, *Tumor*. The pathological section is under

* Extract from *Italian League for the Campaign against Cancer*. 1927, No. 3.
Translated by Dr. Paolo De Vecchi, New York.

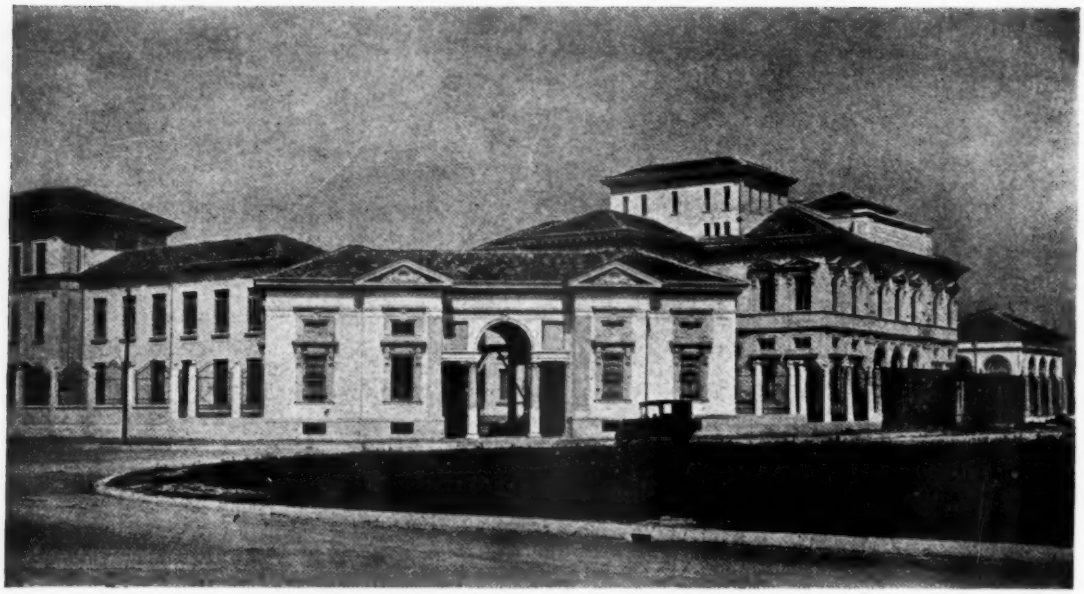

FIG. 2. Central Service Entrance. Administrative offices and laboratories.

FIG. 3. Men's building.

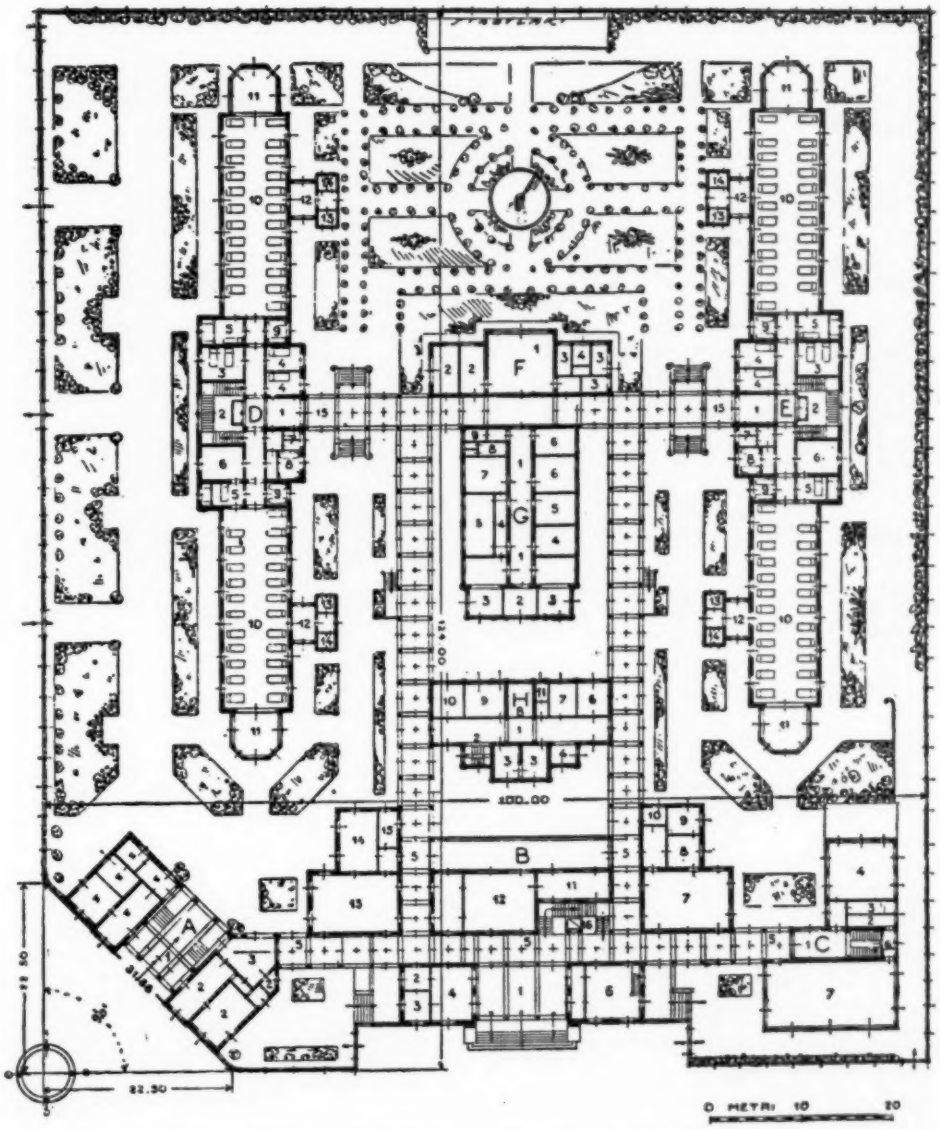

Fig. 4. Plan of the lower floor. A. Gate. 1. Entrance. 2. Concierge. 3. Visitor's room. 4. Service and chaplain. 5. Gallery.

B. Administration Rooms and Laboratories. 1. Principal entrance. 2, 3, 4. Physician on duty. 5. Galleries. 6. Council hall. 7. Waiting room and anatomical museum. 8, 9, 10. Director's room and anatomical section. 11. President's waiting room. 12. Office of the president. 13. Visitor's room. 14. Medical examinations. 15. Service. 16. Stair to basement, with kitchen, pantry and storeroom.

C. Autopsy and Conference Hall. 1. Entrance. 2, 3. Laboratories. 4. Autopsy room. 5. Gallery. 6. Passage and stair to basement. 7. Conference hall. In the basement, deposit for cadavers, microphotograph room.

D. Infirmary for Men. 1. Entrance. 2. Stair to basement. 3. Rooms of paying patients. 4. Pharmacy. 5. Nurse on duty. 6. Storeroom. 7, 8, 9. Bath. 10. Nurses. 11. Veranda. 12, 13. Lavatory. 14. Refuse. 15. Galleries.

E. Infirmary for Women, same as for men.

F. Building for Surgery. 1. Operating room. 2. Room for preparation of patients, armamentarium. 3. Room for surgeon. 4. Service.

G. Institute of Radiology. 1. Gallery. 2. Elevator. 3. Radiumtherapy room. 4. Director's room. 5. Machinery. 6. Waiting room and office. 7. Research laboratory. 8. Lavatory. 9. Dark room.

H. Building for Radiumtherapy. 1. Corridor. 2. Stair to basement. 3. Emanation tubes. 4. Waiting room. 5. Gallery, office. 7. Instrument room. 8. Preparation of radium apparatus. 9. Radium application. 10. Preparation of patients. 11. Lavatories and basement.

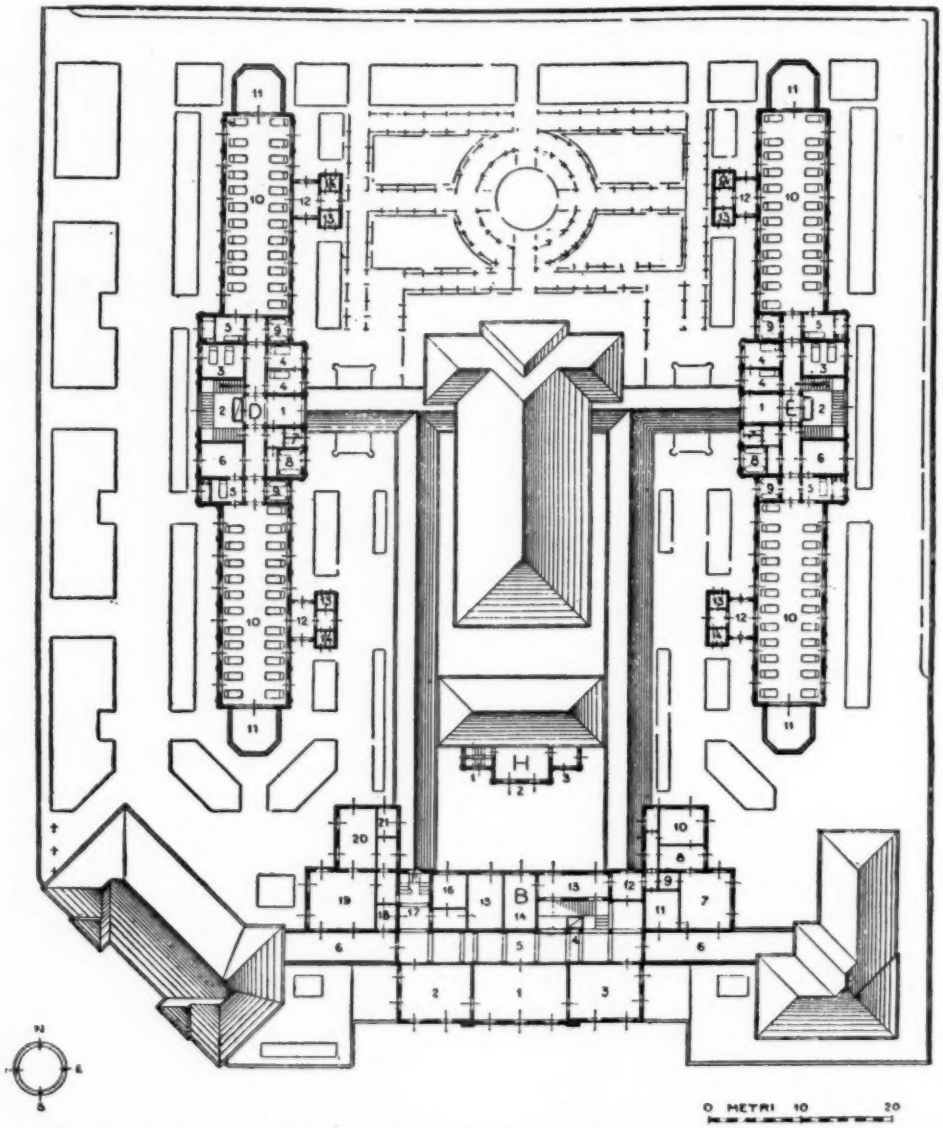

Fig. 5. Plan of the upper floor. A. Administration Rooms and Laboratories. 1. Library. 2. Director's laboratory. 3. Director's room. 4. Stair. 5. Gallery. 6. Veranda. Experimental biological section. 7. Laboratory. 8. Dark room. 9. Thermostat. 10. Assistant. 11. Director, biological section. 12. Waiting room. 13. Instrument and motor room. 14. Preparation room. 15. Laboratory. 16. Lavatory. 17. Stair to 2nd and 3d floors. 18. Scales. 19, 20. Chemical laboratory. 21. Lavatory.

D. Infirmary for men. 1. Entrance. 2. Stair. 3, 4. Rooms for nurses. 5. Nurse on duty. 6. Storeroom. 7. Lavatory. 8. Bath. 9. Writing room. 10. Nursery. 11. Veranda. 12, 13. Lavatory. 14. Refuse. 15. Gallery.

E. Women's Infirmary, same as for men.

G. Institute of Radiology. 1. Gallery. 2. Service stairs. 3. Room for diagnosis. 4. Visitors. 5. Archives. 6. Directors of the Institute of Radiology. 7. Photography, dark room, kitchenette. 8, 9. Stairs.

H. Pavillion of Radiumtherapy. 1. Stairs. 2. Emanation room. 3. Service.

the direction of Professor Pepere, and the biochemical experimental laboratories under that of Professor Rondoni.

The other large buildings are given over to various purposes. There is a free hospital of eight wards, each containing two hundred beds for poor patients, and another section of fifty rooms for paying patients. The gynecological department includes the tumor-treatment section in connection with the obstetrical clinic, which is under the direction of Professor Alfieri. These various sections, as well as that of statistics, are under the supervision of Professor Fichera, Director General of the Institute and Editor of *Tumor*, the official publication of the foundation.

Between the two pavilions are three minor buildings housing the radium and roentgen-ray departments. These are under the care of Professor Perussia, holder of the chair of radiology at the University of Milan. Here also are found rooms for surgical preparation, sterilization, minor operations and medications, the pharmacy, chapel, and the various service departments. The entire institution is equipped with the most modern apparatus of medical science.

The nation owes its thanks to Professor Mangiagalli whose initiative and enthusiasm brought into being this most humane and valuable institution.

CASE REPORTS

CARCINOMA OF THE BLADDER SECONDARY TO ARTIFICIAL CYSTITIS

CALCULUS PYELONEPHROSIS; NEPHRECTOMY AND TOTAL CYSTECTOMY

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NEW YORK

M. W., male, forty-four years of age. In 1911 the patient was first seen by me, and was suffering from a chronic cystitis with contracted bladder. At this time he gave a history that to escape military service his cystitis had been induced. After some treatment at Mount Sinai Hospital in 1911 the symptoms cleared up and the patient improved.

In 1917 he began having symptoms in his right kidney region, pain radiating to the bladder, frequency of urination, and hematuria. Since three months these symptoms had become worse, and he had lost 25 pounds. A roentgenogram taken showed the right kidney occupied by a large stone, and the patient was sent to Mount Sinai Hospital in June, 1927. At Mount Sinai he was cystoscoped and carcinoma of the bladder and a right pyonephrosis were found. In view of the purulent discharge from this kidney, it was deemed advisable to remove the kidney first, and subsequently take care of the bladder neoplasm.

In August, 1927, the kidney was removed by Dr. Hyman. After recuperating from this operation, the patient returned to Mount Sinai Hospital, and a cystoscopic examination on October 18th, 1927, showed the bladder full of foul bloody urine with numerous clots. The capacity was 8 ounces, and there was an extensive growth on the posterior and right and left lateral walls. The cystogram showed an almost normal shaped bladder, except for the fact that the inferior left circumference showed the bladder walls to be slightly raised. By rectum it was possible to detect a hard, infiltrated mass occupying the whole bladder region. In view of the extensive growth which reached apparently well down to the neck of the bladder, the patient was told that he would probably require a total cystectomy, to which he consented.

On October 21st, 1927, the bladder was exposed extraperitoneally and found to be extensively involved, the walls infiltrated well down over the prostate, and as it was seen through the open bladder that it was impossible to remove the growth except by a total cystectomy and prostatectomy, the bladder cavity was gently packed with gauze and an extraperitoneal excision of the bladder done, with the upper two-thirds of the prostate and the seminal vesicle, as well as the lower end of the right ureter (from the point that Dr. Hyman had cut across it at the nephrectomy). The left ureter was then brought out through a gridiron incision in the left iliac fossa. The wound was soaked in alcohol, and the ureter was intubated with a catheter.

After several days through the median suprapubic incision a large number of radium seeds were introduced into the stump of the prostate with the object of destroying any tumor cells that might have been left behind. The patient made an uneventful recovery.

ENLARGEMENT OF THE BREASTS AFTER PROSTATECTOMY*

Lewis T. Mann, M.D.

NEW YORK

DURING January, 1927, J. T., seventy years old, Russian born, had a two stage prostatectomy. At that time no enlargement of the breasts was noted on physical examination. On November 2, 1927, he returned complaining of his breasts enlarging, the right more than the left. He noticed this three weeks ago because his suspenders were causing irritation by bearing pressure on the breasts, giving more of a sense of uneasiness than actual pain. He stated that the increase in size was gradual and that lately he had to discard his suspenders for a belt for comfort's sake.

On examination, the patient is seen to be an old man of rather slight build, showing the usual physical characteristics of senility, atrophied skin, pigmentation, white hair and beard, etc. The external genitalia are apparently normal. The Wassermann reaction is negative.

The right breast is uniformally enlarged, protruding about 6 cm. from the chest wall with a normal male nipple from which no fluid can be expressed. On lifting the breast there can be felt an increase in the amount of glandular tissue but no cyst formation. The enlargement is equal in all quadrants, of firm consistency and no isolated distinct masses can be made out. There is no redness or heat and only a moderate amount of tenderness. On rolling the breast under the hand, it is felt to be moderately firm, not fixed nor indurated and no mass is palpable. Some small, firm, freely movable glands can be felt in the axilla. The left breast presents the same picture but is smaller.

Kondoleon[1] reports two cases occurring in men, both seventy years old. The first developed a swelling of the right breast the size of a walnut one month after prostatectomy and after one year it had entirely disappeared. In the second case, the enlargement was noticed in the right breast three months, and in the left four months after prostatectomy. The swelling receded on the right side in this case.

Oppenheimer[2] reports two cases of breast enlargement in men. The first was in a man of sixty-four following prostatectomy. He was of the muscular male type and noticed enlargement of his breasts three months after operation. The right protruded 9.2 cm. and the left 8 cm. from the chest wall, and on picking up the breast an increase of breast tissue could be made out but not by rolling under the hand. He fails to describe the breasts in further detail but states that the external genitalia were normal.

The second case was a man of forty-eight, also of the muscular male type who had his breasts enlarge some months after sphincterotomy for contracture of the neck of the bladder.

In attempting to explain the etiology of this condition, which he terms "gynaecomastia following prostatectomy," he states that gynaecomastia comes on after a change of the male hormone, especially after castration or atrophy of the testes. He cites Monaschkin[3] who saw this occurring with tumor where greater part of the normal testicular tissue was destroyed. All these men were of a feminine physical type, whereas both of Oppenheimer's were of marked muscular male status.

He points out that so-called prostatectomy is not an extirpation of the gland but generally an enucleation of the tumor mass, the prostatic tissue being left behind with a capsule according to Tandler and Zuckerkandl,[4] Marion[5] and others. The prostate is therefore not destroyed but rather given a chance to recover its function after the tumor is removed. On the other hand the manipulation during enucleation and packing may injure the prostatic tissue outside of the tumor mass. In his cases the adenoma was easily shelled out in the first instance and in the second only muscular tissue was removed.

He states that sexual function after prostatectomy is not necessarily disturbed, quoting Joseph[6] who says that such men after operation have normal sexual function for their age and that coitus is possible and that they have spermatozoa in their urine. Therefore the

* Read before Section of Genito-Urinary Surgery, New York Academy of Medicine, December 21, 1927.

normal sex hormone is evidently still present, but what role the prostate or its internal secretion, if it has one, plays, is hard to say.

As to proof that the prostate has an internal secretion, and if so how it would cause the breasts to grow or whether or not the lack of such an endocrine in the male would do this, no proof is forthcoming.

There have been investigations to determine whether or not the prostate has an internal secretion. Senalach and Pares[7] found that after total extirpation of the prostate in animals that contraction of the ejaculatory ducts and secretion of the preputial glands ceased. Posner and Kohn and Biedl[7] found intravenous injections of watery and glycerine extracts of the prostate to be very toxic. Haberern says that after extirpation in animals function of the other genitalia ceased. Waldeyer[8] believes that if we ascribe an internal secretion to the prostate that the seminal vesicles also must have one. Bachrach[9] agrees with this. Oppenheimer[2] is of the opinion that the prostate has an internal secretion.

Granting then, that the prostate may have an internal secretion, it is impossible to say what influence the presence or the lack of it has on the growth of the breast, especially in an old man after prostatectomy.

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CONGENITAL MALFORMATIONS OF THE FEET

REPORT OF A CASE OF CONGENITAL FUSION OF THE SCAPHOID WITH THE ASTRAGALUS AND COMPLETE ABSENCE OF ONE TOE

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MONTREAL, CANADA

ABNORMALITIES of the feet are comparatively rare. Only two cases of congenital fusion of the astragalus with the navicular are reported in the literature. Holland[1] reports one case of multiple fusion of the bones of the foot in a girl twenty-one years of age. The astragalus is completely fused with the scaphoid, but shows in the upper part an indication of demarcation; no absence of toes. Esau[2] in 1926 reported a case where fusion of the astragalus with the navicular and first cuneiform is noted. Two toes were absent on the right foot and one on the left foot with no fusion on the left foot.

The rarity of the condition and further light it may bring on congenital malformations are the reasons for describing the following case, which was observed by chance during a routine examination.

CASE REPORT

M. S., male, student, aged seventeen. Always well. Parents, grandparents, one brother and one sister all normal. Patient's left foot normal. Tires more easily on the right foot. The right foot has only four toes and is narrower than the left.

Measurements: right 24 cm. long, 6 cm. wide and 20 cm. in circumference. Arch good. Left foot 26 cm. long, 8 cm. wide and 22 cm. in

circumference. Flat foot. One digit completely absent on the right foot. No evidence of undeveloped toe.

The roentgenograms show that the fifth metatarsal and phalanges are absent. Only one metarsal articulates with the distal piece of bone on the inner aspect of the astragalus.

From the appearance of the roentgenograms the writer is of the opinion that the fifth toe is the one that is missing. The scaphoid is apparently fused with the

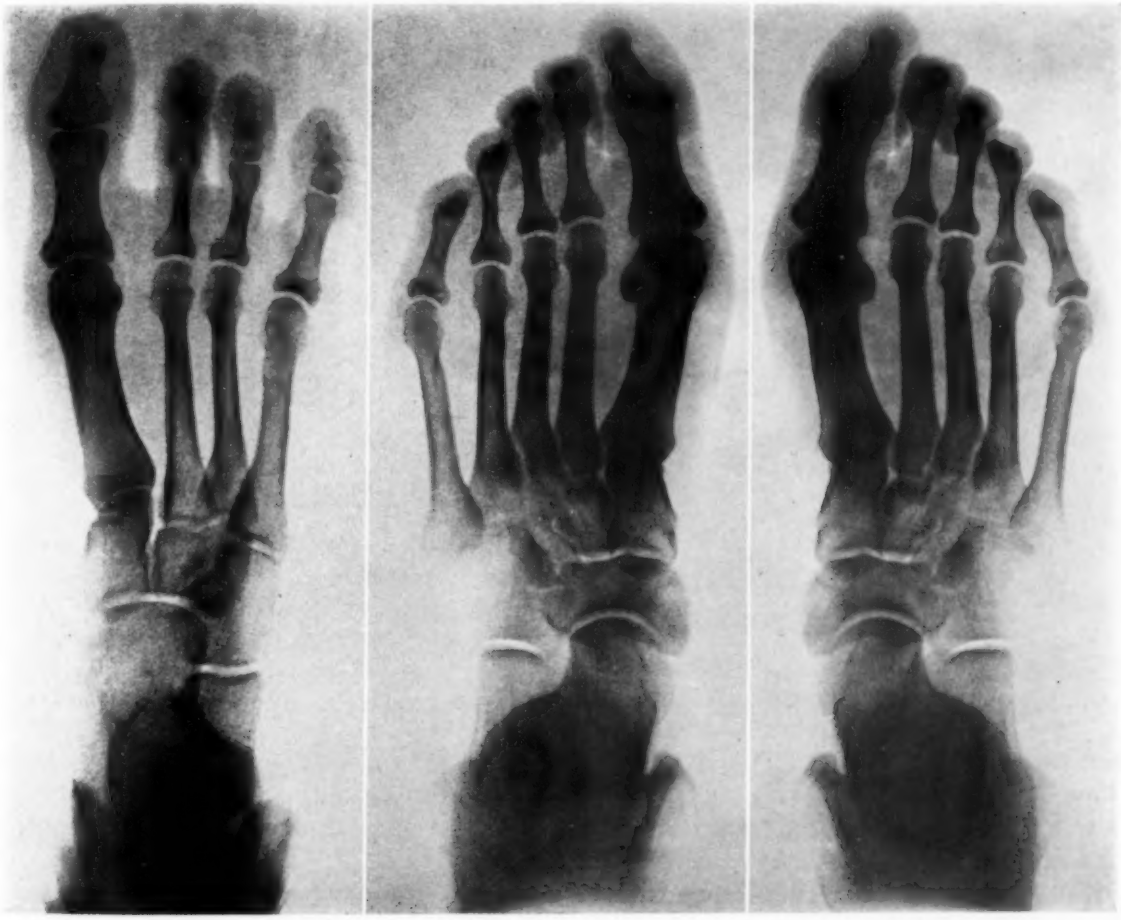

Fig. 1. Fig. 2. Fig. 3.

Fig. 1. Dorso-plantar view of the right foot shows: (*a*) absence of the fifth toe, (*b*) apparent absence of the navicular bone, (*c*) an enlarged head and neck of the astragalus with a bulging to the inner aspect of the foot, (*d*) a shadow of a different density on the outer aspect of the head of the astragalus (an encapsulated piece of bone?) and (*e*) the cuboid articulates with one metatarsal bone and in appearance differs from the normal cuboid in size and shape.

Fig. 2. Dorsoplantar view of the left normal foot.

Fig. 3. Dorsoplantar view of the normal foot. Printed on the wrong side for the purpose of comparing the measurements of the various bones with the corresponding bones of the right foot.

surface of the cuboid. The scaphoid as a separate bone is absent, but the astragalus is unduly protruding and articulates directly with the cuneiform bones. The lateral view shows a roughening and thickening of the head of the astragalus. The dorsoventral view shows an encapsulated astragalus. The internal cuneiforms on both feet are similar in size and appearance; the same applies to the inner four metatarsals on the left foot and the corresponding four metatarsals of the right foot. The difference in length of the two feet corresponds to the width of the navi-

cular of the normal foot, and is a point in favor of complete absence of the navicular bone.

Roentgenological examinations of the rest of the body show no skeletal malformations.

any abnormality for three generations. As in Esau's case[2] the malformation attacked a male, whereas in general it is usually the female that is affected. The malformation in the author's case is unilateral. Usually it is bilateral, although it does not affect

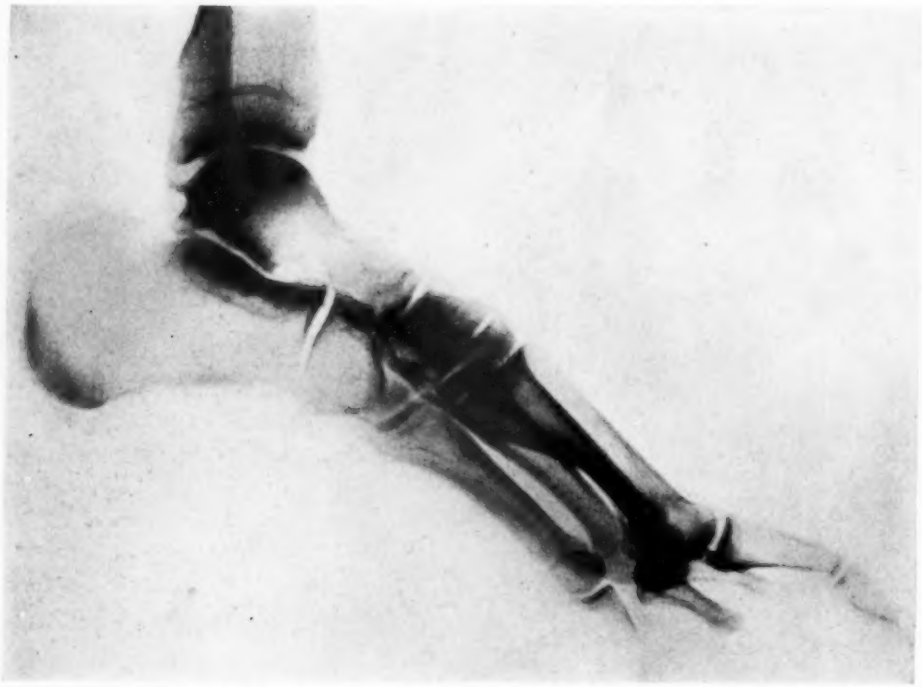

Fig. 4. Lateral view of the right foot shows an abnormally long neck of the astragalus with an irregular line of demarcation at its distal end.

The causes of congenital abnormalities of the foot are not well known. Like other congenital abnormalities they have been attributed to a hereditary predisposition. The case described above does not show any hereditary factor. The immediate members of the family show no skeletal abnormalities. Neither can they trace both sides equally. The abnormality does not inflict any disability upon the foot.

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LYMPHOSARCOMA OF THE SIGMOID

Meyer Golob, M.D.

NEW YORK

Lymphosarcoma of the intestine is a rare condition. According to Rankin,[1] approximately three hundred cases have been reported. The growth may occur at any point from the stomach to the rectum but shows a marked predilection for the ileum. With regard to the colon, lymphosarcoma resembles carci-

noma in that the most frequent location is in the rectum.

Ewing[2] describes the earliest stage of the disease as a localized thickening of the submucosa with or without ulceration. From this point the growth spreads laterally

Fig. 1. Showing barium enema before evacuation with evident obstruction at the end of the descending colon.

Fig. 2. The stomach is pushed to the extreme right by an enormously distended distal colon; patient in vertical position.

invading and destroying the muscular layers and appearing as a subserous tumor. Adhesions form, after which process the central ulceration excavates the tissue. It may produce an aneurysmal dilatation which with peripheral growth yields a large tumor with a roomy cavity. Pronounced stenosis is of rare occurrence. According to Dr. L. F. Barker,[3] "Sarcoma, except in the rectum, does not cause obstruction but rather dilatation of the lumen of the intestine." Chronic peritonitis and chylous ascites are frequently observed in the course of intestinal lymphosarcoma.

Libman[4] states that metastases appear early in the regional lymph nodes and may extend to many of the organs. The cytology of the tumor is that of a small or large round-cell lymphosarcoma. Ewing describes the cells as being large or medium mononuclears with a liberal amount of cytoplasm, lying irregularly in a meshwork of fine fibrils. Surrounding the tumor cells there may be fragile blood vessels and many small lymphocytes.

Clinically lymphosarcoma of the intestine is most common between the years of ten and forty. The disease usually runs a rapid course terminating fatally in a few weeks or months. Rarely is the condition recognized prior to operation or necropsy. The early symptoms are indefinite; furthermore, the condition is so rare that the examiner is not likely to give it serious consideration. The disease may run an extremely acute course and be ushered in by symptoms resembling those of acute appendicitis. On the other hand, anemia, cachexia and progressive weakness may be the predominant manifestations. Lymphosarcoma of the intestine may be suspected but not diagnosed when characteristic roentgenologic findings are obtained.

Unlike carcinoma, lymphosarcoma may grow rapidly to enormous size. This is an important distinguishing point. Since

intestinal sarcomata may attain large size without giving rise to obstruction, a quiet symptomatology may help to differentiate carcinomata; however, some cases of sarcoma give rise to rapidly developing cachexia, ascites and metastases. When intestinal obstruction occurs—but this is not the rule—vomiting and obstipation are to be expected.

As Kalbfleisch[5] has shown, the diagnosis of intestinal obstruction may be made

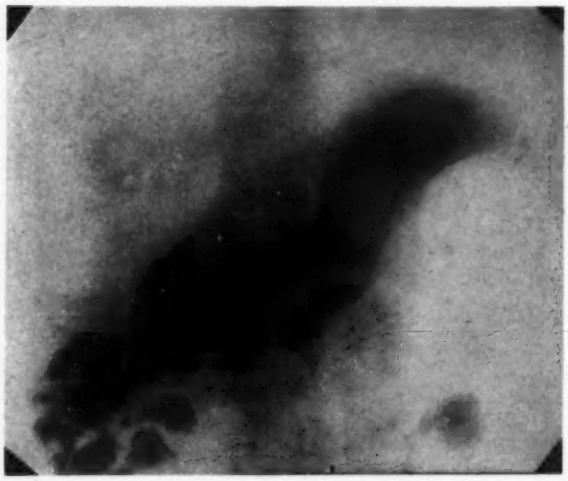

Fig. 3. Showing the stomach with patient in prone position.

by roentgen-ray examination. Distended intestinal loops filled with gas and fluid are suggestive of intestinal obstruction and the diagnosis is confirmed by the appearance of fluid levels in the intestinal loops. The fluid level may be demonstrated by placing the patient in the upright position. When the clinical picture suggests intestinal obstruction, the use of a contrast medium is unnecessary as the distended intestinal loops with demonstrable fluid levels are sufficient evidence.

The prognosis of intestinal lymphosarcoma is bad and treatment is highly unsatisfactory. Surgery seems to offer the only hope of either cure or palliation. Some observers, however, have been encouraged by the results obtained with radium. If the lesion is not too extensive, an attempt should be made to extirpate it; otherwise, a sidetracking operation on the intestinal canal is the most that can be accomplished.

CASE REPORT

L. F., a printer, aged twenty-three, single, complained of nausea, anorexia, weakness and loss of weight of six weeks' duration. The family and previous personal history were negative. The illness began following an indiscretion of diet and had the features of an acute gastritis. In addition to the symptoms already mentioned, there was occasional vomiting and

Fig. 4. Six-hour observation showing the fluid level in the end of the descending colon, with patient in upright position. Proximal to the obstruction, the colon is seen to be enormously distended with gas.

slight chills and fever were observed at times throughout the illness. Although bowel movements took place, the feces were of a scybalous consistency, frank and occult blood negative.

The patient was fairly well nourished. He had marked dental sepsis and traumatic nasal obstruction. Examination of the abdomen showed a certain amount of clapotage and marked borborygmus. No abdominal masses were palpated and tenderness was not elicited.

Three days later he still complained of pain, particularly in the left lower quadrant, and the abdomen was considerably distended. There was board-like rigidity over the seat of the pain. By gentle pressure it was possible to displace the gas noisily from one intestinal

segment to another. This maneuver relieved the pain.

Out of consideration for the associated fever, it was necessary to rule out an acute infectious disease involving the intestine, particularly typhoid fever. The Widal and diazo reactions were negative. The white blood cell count was 12,000; the differential, normal. The erythrocyte count was 4,450,000, the red blood cells showing a normal morphology.

Combined fluoroscopy and roentgenography of the colon by barium suspension enema

Fig. 5. The sigmoid, cut open to show the constriction.

showed complete obstruction in the neighborhood of the splenic flexure. The barium meal showed the stomach to be pushed to the extreme right by the markedly distended distal portion of the transverse colon. A diagnosis of intestinal obstruction was evident, whatever the cause, and immediate operation was considered imperative.

The following is an abstract from a very detailed report received from the New York Hospital.

Operation. The abdomen was opened through a right rectus incision. The intestines were found to be greatly distended. The cecum and appendix were bound down in the pelvis by recent adhesions. On the left side of the abdomen, a white, semi-cartilaginous neoplastic mass was found constricting the lumen of the sigmoid. No enlarged lymph nodes were seen. The mass was delivered with a loop of colon through a second incision on the left side of the abdomen. Cecostomy was performed and the appendix removed.

The patient did well for a time after the operation and the cecostomy relieved the intestinal obstruction but, on the evening of the first day succeeding the operation, he suddenly changed for the worse and went rapidly down hill, developing the typical syndrome of general peritonitis and died a few hours later.

Postmortem Examination. Permission for postmortem examination was restricted to the surgical wounds. When the right rectus incision

Fig. 6. The ileocecal region, to show the lymphadenopathy.

was opened, the peritoneum was found to be covered everywhere with a thin, brownish-yellow, foul-smelling fluid. Soft sheets of green fibrin were seen on many surfaces of bowel and peritoneum. They washed off easily except along the ascending colon, where they were adherent and left a red, roughened surface behind. In the latter region the peritonitis was assumed to be of longer duration. Above the tumor the intestine was dilated to several times its normal diameter. In spite of this dilatation the wall of the colon and lower half of the ileum were greatly thickened. Yet the wall did not feel nodular in any respect, although the folds of mucosa were enlarged sufficiently to give an aspect of corrugation. The intestine was opened throughout its length and the barium sediment removed from the cecum. The appendiceal stump appeared sealed and the cecum was redundant. The mucosa of the bowel was intensely congested.

Several circumscribed nodules resembling enlarged lymph nodes were found in the mesentery. They felt soft and elastic and on section appeared pale, pink and fleshy, resembling granulation tissue. These masses were all

subserous. A frozen section was made of one of the nodules which showed the histologic picture of lymphosarcoma. Similar nodules were found scattered along the colon to a point several inches distal of the sigmoid tumor, but none was so large as those of the cecum, and the transverse colon was entirely free of them. The bowel distal to the tumor was of normal size. The stomach and upper intestine showed only dilatation.

Histologic Examination. The wall of the intestine above the tumor was found to be greatly thickened, being three or four times the normal. The mucosa was intact. There were many plasma cells in the stroma and the endothelial elements lining the small lymph vessels contained a brown pigment. One small nodule lay under the mucosa. It was composed chiefly of small lymphocytes, several large lymphocytes and some reticulum. The bowel at the seat of the tumor showed cytologic changes similar to those of the lymph node. These changes were diffuse and involved the subserous and submucous spaces and the mucosa. The musculature of the intestinal wall was partly fibrosed.

Pathologic Diagnosis. Lymphosarcoma of the colon.

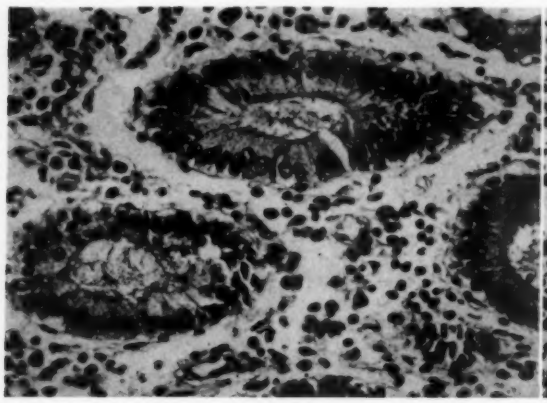

FIG. 7. Cytology of the neoplasm, showing round cell infiltration.

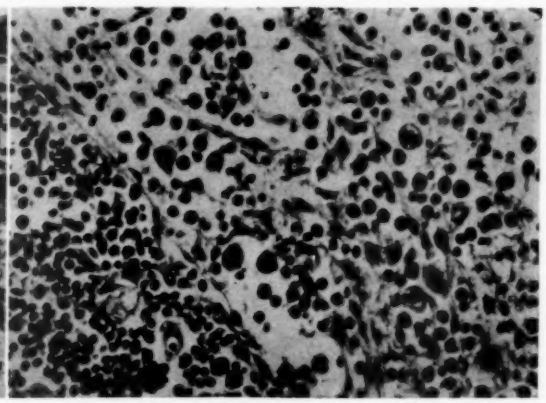

FIG. 8. Same as Fig. 7, another field.

DISCUSSION

The preoperative possibilities as to the cause of the obstruction in this case included (1) volvulus, (2) intussusception, (3) peritoneal tuberculosis, (4) pseudoleukemia intestinalis and (5) a neoplasm, either benign or malignant, particularly carcinoma or lymphosarcoma.

Although the presence of fever would appear to suggest such a condition, peritoneal tuberculosis could be eliminated, especially since roentgenologic examination of the chest showed no evidence of tuberculous foci.

A much more difficult condition to distinguish from intestinal lymphosarcoma is pseudoleukemia intestinalis. The Kundrat type of lymphosarcoma which rapidly extends to adjacent glands but shows no tendency to invade neighboring organs closely resembles pseudoleukemia intestinalis which condition develops simultaneously in many lymph follicles. Even when the lesion is inspected at operation or necropsy, the differentiation is difficult without microscopic examination.

The peritonitis in this case was probably a neoplastic peritonitis of the type described by Smithies[6] in 1917 and also mentioned by Ewing. This type of peritonitis is usually secondary to lymphosarcoma or lymphoblastoma and has its origin in the adenoid tissue along the spine.

SUMMARY

Lymphosarcoma may involve any portion of the intestine but has a predilection for the ileum. In the colon its most common location is in the rectum. The condition is rare, about three hundred cases having been reported. The growth of the tumor is extremely rapid and the condition may terminate fatally in a few weeks or months. There is nothing characteristic about the symptomatology and the disease is rarely recognized before operation or necropsy. Roentgenologic examination may be of considerable help in locating the lesion in some cases and offering a clue

as to its identity. The prognosis is bad, and either eradication or some form of sidetracking operation is the usual surgical procedure.

A case of seven weeks' duration in a man, age twenty-three, is described. The early clinical picture was similar to that of acute gastritis. Nausea, weakness and loss of weight were the most important symptoms. Intestinal obstruction developed, and combined roentgenologic and fluoroscopic examination showed the seat of obstruction to be in the sigmoid. Cecostomy and delivery of the sigmoid growth through the left abdominal wall were performed but the patient died of peritonitis. Postmortem examination revealed a lymphosarcoma of the sigmoid with involvement of the abdominal lymph nodes.

My thanks are due to Dr. Dalldorf, of the New York Hospital, for his coöperation, particularly with reference to the study of the postmortem findings.

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BALL-VALVE COLOSTOMY OPENING IN CASE OF ADENOCARCINOMA OF THE RECTUM*

George A. Wyeth, M.D.

NEW YORK

E. H., male, fifty-four years old, an inventor. Two and one-half years ago had an adencarcinoma of rectum just below the junction with the sigmoid. He had lost greatly in weight, was anemic, somewhat cachectic and badly run down. He suffered chiefly with obstructive symptoms. Diagnosis was fixed with the sigmoidoscope and confirmed by Dr. Frank C. Yeomans who was associated in the case.

In June, 1925, incision in right abdomen and examination for possible liver involvement was made. Palpating down in pelvis a large, movable mass was located which seemed confined to the rectum. After ligating the sigmoid artery, the diseased segment was severed between clamps and removed. The lowermost pair of clamps on distal portion of rectum was left in situ but withdrawn one week later when we removed the remainder of the rectum and anus by the perineal route, thereby completing a modified Coffey operation. The proximal portion of the gut was brought out through a small opening in left rectus and sides of gut stitched to the skin leaving about 7 cm. protruding.

Now the interesting thing about this case is that a hole was made on the side of the gut with the result that the feces do not come through the lumen of the exposed gut but through the newly made opening in the side. The redundant gut has atrophied to a small knob and has formed what I like to call a ball-valve colostomy. This completely plugs the opening and when covered with a small piece of removable gauze and belt applied prevents leakage. As a result, patient ordinarily has a bowel evacuation in the morning after which he cleanses himself, applies a fresh piece of gauze and his belt and goes about his business (with no colostomy odor about him). This case was done throughout by means of the endotherm knife.

* Read before Section of Surgery, New York Academy of Medicine, January 6, 1928.

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EDITORIALS

BIRTHDAY

TWO years is a short time when one looks backward, but we have a feeling which has grown with the passing months that with our first issue of the New Series of THE AMERICAN JOURNAL OF SURGERY in May, 1926, we were inaugurating something new. The rejuvenation of a going concern presents more difficulties than does starting at the beginning with no handicap of tradition. With this first issue we formulated a plan for a surgical publication that might be in fact, as well as in name, *The* AMERICAN JOURNAL OF SURGERY.

In the May, 1926, issue this statement was made: "In the development of our plans for the betterment of the JOURNAL we shall be guided by two standards—useful service and a high quality of journalism." The present issue is modestly submitted as a step in that direction.

Sir William Osler, at the birth of another journal (*The Annals of Medical History*) wrote: "With the active support of all good men it will be a great success." The support of many of the good men of the profession has already been secured for the *new* AMERICAN JOURNAL OF SURGERY, and we humbly believe that the evidence is shown in its pages.

If only half of the promises for further cooperation now in hand are fulfilled, this will be a journal that is destined to take its place as the leader in its field. It is felt that as birthday follows birthday the trend toward further enlargement, progress and improvement will be apparent.

We will not sit back and with a self-satisfied air claim to have reached perfection. This goal, like the pot of gold at the end of the rainbow, is never reached. We do, however, look with pride at what has already been accomplished. The JOURNAL'S influence is being felt in many surgical centers. We note that it is frequently quoted in the literature. In the Year Books THE AMERICAN JOURNAL OF

Surgery has a large percentage of its contributions abstracted. Surgeons of national and world-wide reputation send in manuscripts for publication. We have cordial relations with recognized surgical clinics and their workers in various parts of the world.

We do not intend to outline what we have on hand for the future. Let it suffice that this material is of a high order of scientific merit; it is better that the readers of The American Journal of Surgery judge for themselves.

Our birthday dawned. We have looked admiringly at the two lighted candles on our birthday cake. We feel that we have kept our promises. We have high hopes for the future. The party is over. Come! To our desks and back to our tasks!

—The Publisher and the Editor.

BRITISH LETTER

Let us now praise famous men . . . leaders of the people by their counsel, and by their learning meet for the people, wise and eloquent in their instruction.—*Ecclesiasticus, xliv, 1.*

THIS letter will be devoted to the memory of John Hunter, the founder of modern scientific surgery in this country, for on February 14th, two hundred years ago, Hunter was born at Long Calderwood, some seven miles from Glasgow.

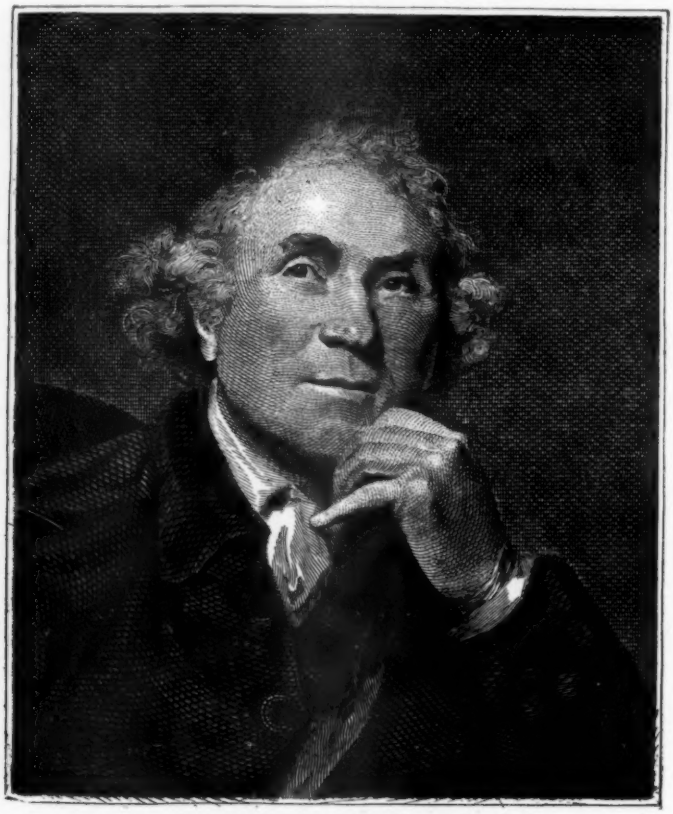
During the month of February the bicentenary celebrations in honour of John Hunter were held at the Royal College of Surgeons, for he was the founder of the museum there and is regarded as the patron saint of the society. Demonstrations were given by the Conservator of the Hunterian Museum, Sir Arthur Keith, and by the Librarian, Mr. Plarr. The Hunterian Oration was delivered by Sir Holburt Waring, and the Thomas Vicary Lecture by Dr. G. C. Peachey. The festival dinner was held at the College under the presidency of Sir Berkeley Moynihan. Other meetings in his honour were held at his old hospital, St. George's, and the Hunterian Society held a festival banquet on February 9th. It must be recalled that the Royal College of Surgeons was not established until 1800, absorbing the Corporation of Surgeons of London which was founded in 1745, and continued the functions of the old Court of Assistants with greatly enhanced powers. The former Court of Assistants was appointed by the company to undertake the examinations for surgeons to His Majesty's Army and Navy and for the diploma of the company. John Hunter was elected with Percival Pott one of first masters of anatomy of this ancient corporation and later became a member of the Court of Assistants.

It was the Corporation of Surgeons which took over Hunter's collection of preparations, manuscripts and books for which the sum of £15,000 had been paid by the Government. In 1806 a further sum of £15,000 was received by the College of Surgeons from Parliament to build a museum to house the collection. In 1800 the Corporation of Surgeons had become, by a charter dated March 22nd, the Royal College of Surgeons in London. This charter was eventually obtained from George III, after the defeat of a bill in Parliament asking that greater powers be given to the Corporation over the profession. The company was thus converted into a college with greatly extended powers over the practitioners of England and Wales with the purview that the art and science of surgery might be better cultivated and the commonwealth of the people of this kingdom benefited.

In 1843 the name of the College was once more changed to the title it now retains, the Royal College of Surgeons of England, with its present constitution of President, Vice Presidents, Council, Fellows and Members. Since 1814 the Hunterian Oration has been given in the College, at first annually but since 1856 biannually, to the memory of John Hunter. The condition of the trust which created this oration requires that

The oration is to be delivered in the theatre of this College (the Royal College of Surgeons) on the 14th. February and such oration is to be expressive of the merits in Comparative Anatomy, Physiology and Surgery, not only of John Hunter but also of such persons who have become deceased, whose labours have contributed to the improvement and extension of surgical knowledge.

Sir Holbert Waring, M.S., F.R.C.S., Surgeon to St. Bartholomew's Hospital, a Vice President of the College, was the chosen orator on this special occasion and gave a most interesting though necessarily brief review of the progress of surgery from Hunter's time to the present day, recording more particularly the results of the work of those pioneers in the science and art of surgery, which has proved of the greatest value in the development of modern practice and technique.



John Hunter (1728–1793).

Hunter after some ten years of surgical practice (1760–70), already acknowledged a great teacher, a profound anatomist, and a pioneer in surgery, declared that it was essential for a surgeon who wished to practice his art with the greatest prospect of success and benefit to his patients, that he should have a close and detailed knowledge of the structure and functions of man in health; that he should be familiar with the changes which take place in man during the onset, course and development of any disease which he is called upon to treat, and furthermore that he should also have a comprehensive and detailed knowledge of the vital processes which take place in the tissues of the patient during the period of recovery from disease and after the performance of a surgical operation.

Hunter endeavored to carry out these essentials by making intensive investigations as to the natural structure and functions of the organs of man, comparing these with numerous and diverse anatomical and physiological studies on animals, and further noting the various alterations under conditions of disease. On these

findings he endeavoured to develop surgery on a real scientific basis. The greatest credit is due to him for the introduction of the experimental method as a means of ascertaining the truth in questions of pathology.

In his address Sir Holburt touched upon the advances in applied physiology, pathology and biochemistry. He discussed the development of anesthesia, local and general, the progress made in the evolution of the modern surgeon's armamentarium and the great changes made in the construction of surgical hospitals and operating theatres. He compares these vastly improved facilities with the somewhat crude methods of Hunter's time and with conditions in the early days of Lister, and does not omit to emphasise the important aids to diagnosis and treatment now at the disposal of the surgeon accruing from the wonderful development of the science of radiology and the use of radium. In his conclusion he says that in his opinion

> The main lines of advance of surgery in the future will be along biochemical and biophysical lines both as regards diagnosis and treatment. If this assumption be correct it is essential that the medical student and the general practitioner of the future should pay increased attention to all biochemical and biophysical problems both in normal and diseased conditions.

Some hitherto unpublished letters written by Wm. Hamilton, son of the Thomas Hamilton who held the chair of anatomy in Glasgow from 1757 to 1781, have been entrusted for publication and presented to the Council of the College by Dr. Louisa Hamilton. These letters, recently published in *The Lancet*,[1] were written in the winter of 1777–78 when the War of Independence was being fought in America. They give most interesting glimpses into the life of the period. Young William Hamilton is loud in his praises of John Hunter as a teacher and lecturer. Sir Arthur Keith is convinced that it was the elder Thomas Hamilton who accompanied John Hunter when he set out on horseback from Glasgow to join his brother William in London in September, 1748, the journey occupying fifteen days. Thomas Hamilton worked with John in William Hunter's dissecting room, eventually returning to Glasgow where he succeeded his brother Robert in the Chair of Anatomy in 1757.

One other most informative letter is included from Dr. Wm. Irvine to Professor Thomas Hamilton. The letter is dated June 17, 1771; the writer says he had spent most of the time for the past fortnight with John Hunter "from whom I have received a great deal of what is new to me, and which, though it may not be so much to you, cannot be disagreeable." It shows the variety of Hunter's experimental work, describing in brief some observations of his on wounds, hydrocele, experiments on the blood and blood vessels, the grafting of teeth and testes and some comments on the practice of midwifery with allusions to the methods of treatment of Dr. William Hunter and of his disinclination to use any instrument whatever in delivery and among other details that he never attempted to force the extension of the placenta. It appears that Irvine and Thomas Hamilton had studied together under Dr. William Hunter, and both were cited as witnesses when William Hunter accussed Munro Secundus of plagiarism. These letters provide most convincing proofs of John Hunter's geniality, his kindly disposition and his skill as a teacher. They give numerous instances of his boundless energy, his great enthusiasm and zeal for all and every kind of research bearing upon not only surgery but anatomy, physiology and experimental pathology, and mark him the master of scientific surgery of the eighteenth century. It is, therefore, peculiarly fitting that these letters should come to light during the present celebrations.

Dr. G. C. Peachey gave the Thomas Vicary Lecture, choosing for his subject "The Homes of the Hunters" and recall-

[1] John Hunter: Bicentenary Celebration. *The Lancet*, 1928, ccxiv, 354–360.

ing many incidents in the extraordinarily active lives of the brothers, William and John, in the London of the eighteenth century. He spoke of the beginnings of William Hunter's prosperity, his association with Smellie and Douglas, the launching of the School of Anatomy and its success under his guidance and the industry of his brother John.

We get gleanings of the development of John Hunter as an anatomist and surgeon, of his career at St. George's Hospital, particulars of his experiments in his letters to his favorite pupil, Jenner. In fact we read of his tremendous energy and devotion to the cause of the science he loved, and how he was prepared to lavish almost all his money on the collection of specimens for his museum. At his country house at Earl's Court he devoted himself to the study of biological problems and was eager to buy any animal he could lay hands on alive or dead for this purpose. The large house in Leicester Square he converted in part into a museum, lecturing theatre and dissecting rooms, although in doing it he sadly crippled his resources and was obliged to borrow money on loan. We are told again that John Hunter was not altogether an easy person to get on with, and that neither he nor his brother could endure opposition. This may be so but I cannot conceive that he was not a likeable man, for he undoubtedly possessed the affection of most of his pupils and of all those who knew him intimately and worked with him. Paget in his life of John Hunter suggests that between the ages of thirty and forty years he conquered the roughness, ignorance and isolation of his earlier life. In his married life he was most fortunate and confessed himself to be one of the happiest men living. There is no doubt that the loss of his brother's friendship was a bitter grief to him, otherwise he would not have been so overcome with emotion when he told his pupils of the loss which anatomy had sustained by his brother's death.

John Hunter's association with St. George's Hospital was marred by the petty jealousies of his surgical colleagues, which were greatly intensified by the fact that he openly despised them for their lack of enthusiasm and initiative in their work. Further he did not hesitate to accuse them of general indifference and neglect in teaching the hospital pupils. His censure was to some extent deserved, for one of his colleagues avowed that he did not choose to lose any reputation he might have in surgery by giving lectures, and another confessed that he did not see where the art could be improved. Nevertheless, we know that neither Gunning, Walker nor Keate, his three surgical colleagues, could be described as incompetent; they were certainly not men to be pushed roughly aside or despised, for they had proved themselves surgeons of ability and keen rivals in practice, and consequently were not going to be overridden without a struggle, even though Hunter might be their superior in mental capacity and professional attainments.

Throughout his struggles with these vigorous opponents Hunter probably felt in his own mind that his personal record of attainment would eventually carry the support of the Board of Governors in his favour. His last requisition to the Board was that they would admit two pupils under him who had not certain credentials which others of his colleagues thought necessary. The meeting of the Board was fixed for October 16, 1793. Hunter that morning told a friend there would be a dispute and he felt sure it would be the end of him. He arrived late at the meeting, presented the petition of his two pupils and spoke on their behalf. One of his colleagues flatly contradicted something he said. Hunter immediately stopped speaking, suppressing his feelings of rage and mortification; he was seized with the pain of a sudden attack of angina and hurriedly withdrew from the meeting and staggered into an adjoining room where with a deep groan he fell lifeless into the arms of Dr. Robertson who chanced to be there.

Such was the tragic end of John Hunter. Yet even this sudden fatal seizure brought forth no kindly thought or sympathetic action from his colleagues on the staff or from any other members of the Board. At the next meeting of the Board there was no mention of the tragedy not even a vote of condolence. It is sad to think that the bitterness of hostility remained and his merits were not appreciated by his generation. Despite his rugged exterior and his occasional harshness he loved his friends. By his great industry he acquired knowledge which he hoped would command the respect if not the admiration of his professional brethern; instead he was the subject of their envy, hatred and malice. At the time of his death his isolation from his surgical confreres at the hospital where he had given so great and so devoted service was in fact complete. This subtle antagonism to a man of his disposition must have been a grievous disappointment and must have aroused in him the bitterest feelings of resentment which would be most difficult to suppress.

Despite his peculiarities of temper and his occasional rudeness he had a heart of gold; he loved his friends and was ever ready to sacrifice his time and willing to place whatever resources he had at their disposal, hoping at least that his affection would be returned. But in this he was sorely disappointed, and must have felt the truth and bitterness of his brother William's complaint to his sister, Mrs. Baillie: "That I have lived to have my affections much disturbed by ingratitude!" Of all his pupils, Edward Jenner undoubtedly was the most dear to him and kept his confidence and highest regard until his death. We are told by Baron that Jenner called John Hunter "the dear man" and when he described the honesty and warmth of his heart and his never-ceasing energy in the pursuit of knowledge, it was impossible not to be animated by the recital.

Two of his old pupils, Adams and Abernethy, spoke of him as an excellent teacher and a most agreeable companion. Abernethy said:

> Mr. Hunter was a man of very considerable humour. His views of subjects in general were quick and peculiar, and when so disposed he could place them in a very ludicrous point of view. His greeting of the elder Physick was quite characteristic when he brought his son Philip Syng Physick to be his pupil and asked what books he should read, Hunter replied, "Sir, follow me, I shall show you the books your son has to study." He then took him into the dissecting room, and showed him the bodies. "These are the books your son will learn under my direction, the others are fit for very little."

Faults of temper should not be counted harshly against a man struggling against ill health for many years. In all other things he appears to have had a steady hold of himself, for we are told that he abstained from wine at a time when wine was drunk like water, forced himself to give lectures, took up his pen and undertook the to him particularly distasteful task of writing books. Not only did he make men work for him but he gave his pupils that insight into the knowledge of anatomy and surgery which produced later such famous men as Henry Clive, John Abernethy, Astley Cooper and William Blizard. Aided by a gracious and clever wife, he entertained generously at his town house numerous friends and celebrities of the time. The London of the eighteenth century was the London of Gay and Hogarth, of Fielding and Smollett, of Johnson and Goldsmith, of Garrick and Reynolds. Mrs. Hunter was the friend of Mrs. Montague and Madame D'Arblay and of Haydn, the musician, for whom she wrote the words for the Oratorio "Creation" and the song "My Mother Bids Me Bind My Hair." She published after his death a volume of poems and had inscribed an epitaph to Hunter on a memorial tablet in St. Martin's in the Field which reads:

> Here rests in awful silence, cold and still,
> One whom no common sparks of genius fired;
> Whose reach of thought Nature alone could fill,
> Whose deep research the love of Truth inspired.

Hunter! if years of toil and watchful care,
If the vast labours of a powerful mind
To soothe the ills humanity must share,
Deserve the grateful plaudits of mankind—

Then be each human weakness buried here.
Envy would raise to dim a name so bright;
Those specks which in the orb of day appear
Take nothing from his warm and welcome light.

Hunter loved his home life; he was a devoted husband and a fond parent. He often said that if he had been allowed to bespeak a pair of children they should have been those with which Providence had favoured him. Despite such a lovable nature, he was denied the friendship of the surgical colleagues he had to work with and compete against. Is it unnatural that he was embittered and that at times of extreme irritation he should denounce them in mild terms?

Peachey ends a most engaging address with the following words:

In the brilliant sunshine of modern surgical progress begun by Simpson with the introduction of chloroform anesthesia and culminating in the magnificent triumph of Lister, our eyes are apt to be blinded by the debt we owe to the perseverance and genius of John Hunter.

This last general statement is a fascinating ending to a lecture full of historical interest, but in regard to the question of the introduction of anesthesia, we in England acknowledge that the honour and glory of first discovering how to produce anesthesia by using ether is linked up primarily with the pioneer efforts of Crawford W. Long and William T. G. Morton, and realise without entering into the claims, contradictions and counter claims that Long was the first man to operate successfully under ether anesthesia, and that Morton was the first to demonstrate its wonderful anesthetic properties to a gathering of medical men on a living patient at the Massachusetts General Hospital. On this great occasion John Collins Warren removed a tumour in the neck painlessly and successfully from "Gilbert Abbott, age twenty, Single, painter" on October 16, 1846. In England Robert Liston, famous for his boldness, rapidity and skill in operating, was one of the first surgeons to undertake an operation on a patient which he did under ether in London at the University College Hospital. Sir James Young Simpson, however, fought the battle for anesthesia in this country and successfully established the practice of anesthesia in the face of great opposition, but it is clear to us today that Simpson magnified the superiority of chloroform over ether. He looked upon ether as a stage in the development of a more perfected anesthesia which he had been able to introduce by using chloroform. Laing Gordon says Simpson regarded chloroform as the only anesthetic; his utterances betrayed this feeling, and offence was naturally taken by the introducers and advocates of ether. He succeeded, however, in convincing the leading surgeons of Europe of its many advantages so that in a short time and with a few exceptions it was for a considerable period in general use as the anesthetic of choice.

This digression leads me to refer to a remarkable passage in the Greville Memoirs, republished this year, in which Charles Cavendish Fulke Greville (Clerk to the Privy Council, a kinsman of the Duke of Portland and the Earl of Warwick of that day) describes as a novelty the use of an anesthetic. The date on which Greville witnessed the operation was December 24, 1847, the year in which Simpson first began to employ chloroform as a general anesthetic.

I went yesterday to St. George's Hospital to see the chloroform tried. A boy two years and a half was cut for a stone. He was put to sleep for a minute; the stone was so large and the bladder so contracted, the operator could not get hold of it, and the operation lasted above twenty minutes, with repeated probings by different instruments. The chloroform was applied from time to time, and the child never exhibited the slightest sign of consciousness and it was exactly the same as operating on a dead body. A curious example was shown

of what is called the etiquette of the profession. The operator (whose name I forget) could not extract the stone, so at last he handed the instrument to Keate, who is the finest operator possible, and he got hold of the stone. When he announced he had done so, the first man begged to have the forceps back that he might draw it out and it was transferred to him; but in taking it he let go the stone and the whole thing had to be done over again. It was accomplished, but not of course without increasing the local inflammation and endangering the life of the child. I asked Keate why, he had got hold of the stone he did not draw it out. He said the other man's dignity would have been hurt if he had not been allowed to complete what he had begun. I have no words to express my admiration for this invention which is the greatest blessing bestowed on mankind, and the inventor of it is the greatest of benefactors whose memory ought to be venerated by countless millions for ages yet to come. All the great discoveries of science sink into insignificance when compared with this. It is a great privilege to have lived in times which saw the production of steam, of electricity, and now of ether, that is, of the development and application of them to human purposes, to the multiplication of human enjoyment and the mitigation of pain. But wonderful as are the powers and the feats of the steam and the electric telegraph, the chloroform far transcends them all in its beneficient and consolatory operations.

I have taken the privilege of quoting this remarkable passage in full for I would call attention to Greville's curious observance of the incident of what he calls the etiquette of the profession, to his admiration for the skill of Keate, who in this instance happened to be Robert Keate, the nephew and successor at St. George's of John Hunter's bitter antagonist, Thomas Keate. But more particularly would I call attention to the tremendous impression the successful administration of an anesthetic had upon the mind of an intelligent observer and man of the world of this early Victorian period, and his fervent declaration of its wonderful influence for the good of suffering humanity.

John H. Watson.
Burnley, England.

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[From Fernelius' Universa Medicina, Geneva, 1679.]

BOOKSHELF BROWSING

THOMAS ADDIS EMMET, 1828

CHARLES A. GORDON, M.D., F.A.C.S.

BROOKLYN

Thomas Addis Emmet needs no eulogy. Words of appreciation are futile, no more necessary than the unwritten epitaph of his immortal ancestor, Robert Emmet, whose ringing words are known to every schoolboy:

> Let no man dare when I am dead to charge me with dishonor. Let no man attaint my memory . . . Let no man write my epitaph, for, as no man who knows my motives dare now vindicate them, let not prejudice or ignorance asperse them. Let them and me rest in obscurity and peace, and my tomb remain uninscribed, and my memory in oblivion, until other times and other men can do justice to my character.

Just as Robert Emmet, by a single speech, became the most memorable of the many martyrs of Ireland, so Thomas Addis Emmet, by his work in vesicovaginal fistula, has won a place among the immortals of medicine.

Founded largely upon the work of McDowell and Sims, operative gynecology had its beginnings in this country. The famous operation upon Mrs. Crawford was done in 1809, yet in 1790 William Baynham of Virginia had successfully operated for extrauterine gestation, and in 1816 John King of Edisto Island, South Carolina, had performed a remarkably successful operation for abdominal pregnancy.

Before 1852 vesicovaginal fistula was a very common and all but hopeless lesion. Since Ambrose Paré, the great surgeons of the world had attempted its cure. Many operative procedures had been recorded and a few successes had been reported by Mettauer of Virginia, Hayward of Boston, Pancoast of Philadelphia and Maisoneuve in France.

Then J. Marion Sims, with a wave of his hand, transformed the Cinderella of surgery into the lovely lady of gynecology. Sims and Emmet! The greatest names in gynecology. Master and pupil. Sims, the teacher of Emmet and Emmet, the teacher of us all. As Kelly says, "He caught Sims' idea at once, acquired his methods and improved upon them, and did more than any other surgeon to teach the members of the profession in this country how to do these operations."

It is peculiarly fitting that at this time we commemorate his service to gynecology, if not by solemn observance, then by calling to mind the accomplishments of his long and useful life.

Just a hundred years ago, on May 29, 1828, Thomas Addis Emmet was born.

His was a great heritage. In his veins ran the blood of martyrs, of men of steadfast purpose and unyielding principle who suffered and died and abandoned home and

country for the right of free speech and liberty. Seven generations of Emmets had been physicians, many of whom had been more than ordinarily distinguished. Another Thomas Addis Emmet, his grandfather, after whom he was named, suffered imprisonment and exile, after his brother Robert had met his death upon the scaffold. When he came to New York in 1804 on his way West, Governor Clinton persuaded him to remain. One of his sons, John Patten Emmet, after practicing medicine in New York, was appointed by Thomas Jefferson to the chair of Natural History in the University of Virginia. Here at Charlottesville Thomas Addis Emmet was born.

His childhood at the University was gloriously crowded with memories of great men and events. A journey to New York, made chiefly by stage coach, required nearly a week. He walked over a bridge at Canal Street, crossed a dusty country road called Broadway into a cornfield and looked upon the Astor House as one of the greatest buildings in the world.

Studying medicine at Jefferson, he was graduated in 1850. Although his knowledge of anatomy was excellent, he had dissected but a single muscle and had never attended an obstetrical case. Medical education apparently left much to be desired, as it does now.

This was just after the frightful Irish famine when several hundred thousand immigrants landed in New York and were dying everywhere of ship fever or typhus. Temporary buildings for three or four thousand beds were erected on Wards Island. Here Emmet served as resident physician for three years, contracted typhus twice, nearly losing his life both times.

Appointed a visiting physician to the hospital at a salary of four dollars a day, he soon married and made every effort to build up a private practice from which his first year's income was fifty dollars. His honorarium for tenement house calls was twenty-five cents.

The association with Sims, which changed the whole course of his life, had a most romantic and unusual beginning. It will bear repetition here in Emmet's own words:

> In the early spring of 1855, I was engaged late one night with my case book in tabulating all the features of each typhus fever case I had treated at Wards Island, so as to obtain, as it were, the natural history of the disease. It had been snowing all day and the quiet was conducive to continued work, when I was startled by a loud rap on my window. On opening the door I admitted Dr. Marion Sims, whom I had met before, but I did not recognize him until he introduced himself. He stated that his car had gotten off the track almost opposite my house and seeing my light burning he had come in to warm himself, as he had become chilled from standing so long outside.
>
> After he had revived, seeing my table covered with papers, he asked what work I was at. On explaining the system and what I expected to accomplish, he suddenly said: "Well,

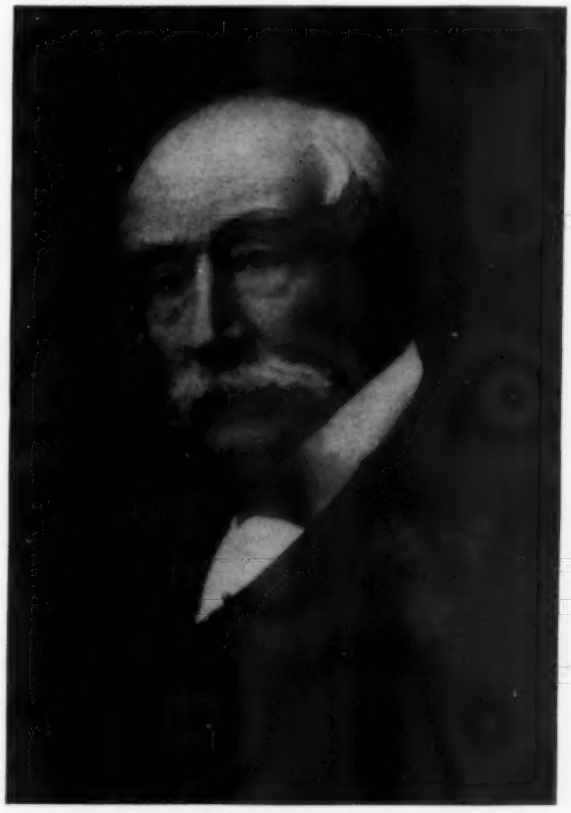

Fig. 1. Thomas Addis Emmet, M.D. (1828–1919).

Doctor, you are just the man I am looking for, and if you will come up to the hospital tomorrow morning at nine o'clock I will show you something you have never seen before . . . and I can have you to assist me."

The next morning for the first time Emmet watched Sims close a vesicovaginal fistula. Here at the Womans' Hospital after five and a half years association with Sims, Emmet became a great master of the plastic surgery of the bladder, the perineum, the vagina and the cervix.

For years he gave three clinics a week, with blackboard and chalk, detailing every step of the operation. These clinical lectures were the first of the kind and were attended by surgeons from all over the world. This, with his contributions to medical literature and his book, "The Principles and Practices of Gynaecology," which was published in 1879, reflected great credit on the Woman's Hospital.

His monograph on "Vesico-Vaginal Fistulae," published in 1868, was dedicated

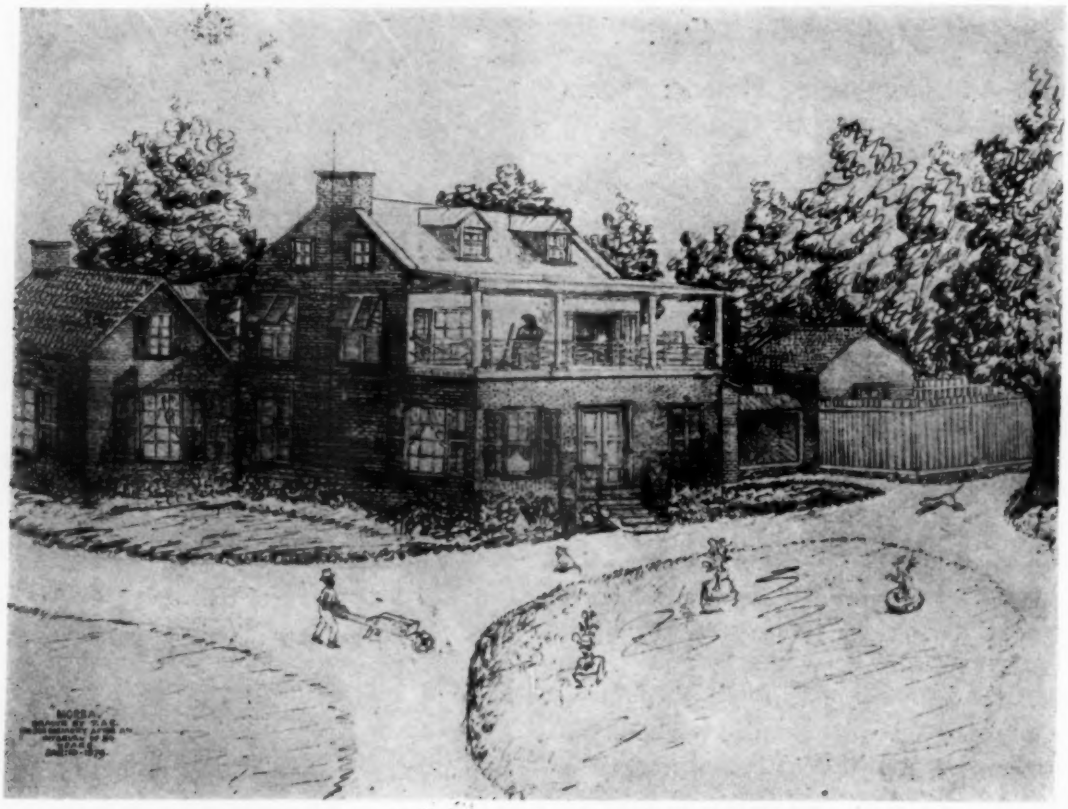

Fig. 2. Residence of Professor Emmet near the University of Virginia. From a pen-drawing made from memory in 1898 by Dr. T. A. Emmet. Figures 1 and 2 are reproduced with permission of the executor from "Incidents of My Life" by Thomas Addis Emmet," N. Y., G. P. Putnam's Sons, 1911.

He was a tireless, painstaking operator, with wonderful hands, patience, persistence and marvelous native ability. He had a great fondness for the mechanical arts and once owned a collection of tools selected from almost every trade. With these he could fashion out of wood or iron almost anything he desired. Even at the beginning of his work he wrote careful histories of all his cases with drawings and descriptions of the operation.

"To J. Marion Sims, My Instructor." Although he operated upon 600 cases, only 270 were recorded here. He pointed out that only three of these were due to use of the forceps, the others to delayed delivery and impaction slough. His clear statement as to its etiology did much for backwoods obstetrics.

Large fistulae were closed, sometimes by repeated operation, under ether or opium anesthesia, some in the Sims position,

some in the knee-chest. He was an adept in the use of scissors. "Scarcely any case," he said, "can be regarded as incurable in consequence of loss of tissue alone. So certain was he of successful end result that he advocated temporary fistulae for bladder drainage in cystitis. He made button holes in the urethra for diagnosis, and often closed vaginal fistulae temporarily with silver wire without denudation of their edges.

He made careful anatomical studies of the fascial supports of the perineum, described the etiology of perineal laceration and devised an operation which has served as a basis for discussion ever since. Thomas had said that a woman might better break her leg than her perineum.

His work on the cervix is memorable. He first called attention to its frequency of laceration, described its pathology and symptoms, and first repaired the cervix in 1862, using a uterine tourniquet made out of a portion of a watch spring, to control bleeding during the operation. "So long," he said, "as there can be detected, by pressure from the finger, any tenderness in the neighboring connective tissue, it is not safe to operate."

When his paper was presented, Dr. H. T. Hanks said, "Many of us have not realized that the lesion described by Dr. Emmet is a common one." Marion Sims said,

"I only wonder that this operation had not been worked out sooner. The operation as devised and practiced by Dr. Emmet is as simple, as safe and as certain in its results as is the operation for a simple case of vesico-vaginal fistula. We must accept it as Dr. Emmet has given it to us. We cannot change it. We cannot improve it, for it is perfect—perfect in its method, and perfect in its results."

It is interesting to note that Dudley, once his resident surgeon, coined the word trachelorrhapy and submitted it to Emmet who consulted Peasles, a scholar with a great reputation. With his approval the word first appeared in a paper by Dudley.

With the publication of fifty or more papers on medical subjects, Emmet wrote and lectured often on English rule in Ireland, at first as a medical student. All his life he was closely identified with Irish politics, his faith and enthusiasm increasing with the years, his love of liberty burning with undiminished flame.

In his love of letters he was not surpassed by his classmate, S. Weir Mitchell. For years the second floor of the house next to his was wholly filled with his library and collection of Americana. He had collected documents with complete autographs and portraits of every individual connected with the Albany Congress of 1754, the Stamp Congress of 1774, the various Continental Congresses, and a set of the Signers of the Declaration of Independence with an original copy of the Declaration in Jefferson's handwriting, a full history of its passage and signing and original autographs and portraits of the Signers. He also possessed material on the Articles of Federation, the Annapolis Convention (with the original minutes) and the call for the Constitutional Convention with its first amendments as passed and certified by the Vice President and the Secretary of the Senate. There were thirty thousand portraits in all, a large collection of Colonial paper money, Confederate paper and bonds and one hundred and fifty bound volumes of Colonial newspapers. Tireless research occupied many years of his life.

Thomas Addis Emmet was present as a medical student at the first meeting of the American Medical Association in the Academy of Natural Sciences, Philadelphia. He was twice Vice President of the Medical Society of the County of New York, a founder of the American Gynecological Society in 1876 and its President in 1882. His was a clean life, rich in honors. It ended in death in 1919.

"A physician is worth many men."

BOOK REVIEWS

SURGERY. ITS PRINCIPLES AND PRACTICE FOR STUDENTS AND PRACTITIONERS. By Astley Paston Cooper Ashhurst, A.B., M.D., F.A.C.S.; Professor of Clinical Surgery, Univ. of Pennsylvania; Surgeon, Episcopal and Philadelphia Orthopedic Hosps. and Infirmary for Nervous Diseases; Colonel, Medical Reserve Corps, U. S. Army. Ed. 3. 8 vo. Cloth. Pp. 1179, 15 colored plates and 1046 illus. Phila., Lea & Febiger, 1927.

Ashhurst has improved his work with each edition and this one may be sincerely recommended for study as a textbook of general surgery. Many sections have been entirely rewritten or introduced as new matter, and the book shows wide reading and generous reference to the work of others. As in the earlier editions, bibliographic references are omitted, but the names of surgeons cited are followed by the year of the publication cited, which makes library work easier. There is, too, an index of authors in addition to the subject index. The more important operations and surgical manipulations are described in detail. In this edition the illustrations, many of them new, are nearly all original.

Here and there Ashhurst's methods are boldly at variance with those more generally accepted and, we think, more modern. Some years ago he wrote a prize essay on fractures of the elbow, and the section of his book devoted to that subject we commend for careful reading. But concerning the treatment of fractures of the upper end and the shaft of the humerus, the student would do well to read other works.

* * *

MINOR SURGERY. By Arthur E. Hertzler, M.D., F.A.C.S.; Chief Surgeon, Halstead Hosp., and Victor E. Chesky, A.B., M.D., F.A.C.S.; Chief Resident Surgeon, Halstead Hosp. 8 vo. Cloth. Pp. 568, 438 illus. St. Louis, C. V. Mosby Co., 1927.

This attractive and profusely illustrated book is intended as a help to the worker in out-patient surgical departments, and the novitiate in that field will certainly find much instruction here. The book by no means covers, however, the whole field of minor surgery, and yet in some places it goes well outside of it. We do not think, for example, that the technique of operations for umbilical and femoral hernia belongs to minor surgery or to the dispensary, nor does operation for inguinal hernia except, perhaps, in infancy.

* * *

Rose and Carless' MANUAL OF SURGERY. For students and Practitioners. By Albert Carless, C.B.E., M.B., M.S. (Lond.), F.R.C.S., F.A.C.S. (Hon.); Emeritus Professor of Surgery, King's College, London; Consulting Surgeon, King's College Hosp., and Cecil P. G. Wakeley, F.R.C.S. (Eng.), F.R.S. (Edin.); Erasmus Wilson Lecturer, Royal College of Surgeons of England; Assistant Surgeon, King's College Hosp.; Lecturer in Surgery, King's College Hosp. Medical School; Assistant Surgeon, Belgrave Hosp. for Children, and West End Hosp. for Nervous Diseases. Ed. 12. 8 vo. Cloth. Pp. 1544; 639 illus. N. Y., William Wood & Co., 1927.

"Rose and Carless," now thirty years old, is the classic of modern British textbooks of general surgery with which, among American single-volume works, we would compare only the extensive treatise of DaCosta. With this and with other textbooks of general surgery in this country, "Rose and Carless" shares popularity with American students.

It is but three years since the preceding British and American editions appeared, but there has been no inconsiderable revision and several new illustrations added. In this work Prof. Carless has had Mr. Cecil P. G. Wakeley as an associate, and others have helped in revising special sections, as in pathology and anesthesia.

* * *

EMERGENCIES OF A GENERAL PRACTICE. By the late Nathan Clark Morse, A.B., M.D., F.A.C.S. Ed. 2, revised and rewritten by Amos Watson Colcord, M.D.; Surgeon, Carnegie Steel Co.; Surgeon, Pennsylvania Railroad System. 8 vo. Cloth. Pp. 541; 311 illus. St. Louis., C. V. Mosby Co., 1927.

Colcord's experience in industrial surgery fits him well for the revision of this interesting work. It is replete with practical instruction in the management of the accidents and emergencies of surgical, obstetrical and medical practice, and we commend it not only to the practitioner in smaller communities but to practitioners generally.

We would criticize only the description of the Crile method of blood transfusion by arterio-

venous anastomosis. This method has long since been superseded by simpler ones and certainly has no place in modern emergency surgery. The Lewisohn and Lindeman methods are described, but not the useful Unger method (which, however, requires a special apparatus). The book is attractively printed and very well illustrated.

* * *

Practice of Urology and Syphilology. A Surgical Treatise on Genito-Urinary Diseases and Syphilis. By Charles H. Chetwood, M.D., LL.D., F.A.C.S.; Attending Urologist and Director of Service, French Hosp.; Consulting Surgeon, Bellevue Hosp.; Special Consulting Surgeon to Knickerbocker, St. Johns, Nassau, St. Agnes and White Plains Hosps. Ed. 4. 8 vo. Cloth. Pp. 879; 314 illus. N. Y., William Wood & Co., 1927.

Chetwood appears to have made a sincere effort to incorporate in this edition of his well-known work the advances in urology brought forth by the past few years. The revision has been too general to call attention to all the changes but, among others, is to be noted greater emphasis on the various pathological processes in gonorrhea, and on the specific, rather than the routine, treatment of cases according to the variations in these processes. Much has been added to the description of transurethral and transvesical endoscopic operations. The employment of the newer antiseptics is described. The techniques of caudal and spinal anesthesia have been incorporated. In the sections dealing with kidney and prostatic surgery greater emphasis has been laid on preoperative and postoperative care; the distinction between nephritis and nephrosis has been recognized and described, and the latest classification of surgical lesions of the kidney has been included. Focal infections in the urinary tract are discussed in the sections on diseases of the prostate and seminal vesicles. The employment of diathermy and new methods for applying radium in urology are adequately considered. Over one hundred new illustrations appear.

* * *

Kurze Geschichte der Chirurgie. Von W. von Brunn, Professor fur Geschichte der Medizin an der Universität Rostock. Mit 317 Abbild. Berlin, Julius Springer, 1928.

Although entitled a "short history" of surgery, this work of Professor Brunn's is much more comprehensive than most of the more extensive works which attempt to cover the field. Beginning with a resumé of all that is known of the surgical procedures employed by prehistoric or primitive peoples, Brunn passes to a consideration of the history of the art as preserved in the stone or other drawings and writings of the Egyptians, Chinese, East Indians, Mexicans and Peruvians. His account of early Greek and Roman surgery is adequate in all respects, and though he does not devote much space to the surgery of the Arabs, he manages to give in a few words an adequate account of Arabian surgery as practiced by its greatest exponent, Albucasis.

On the history of the art of surgery during the Middle Ages this book is particularly good. Brunn makes good use of the many manuscripts which have been discovered and studied by Sudhoff and his school. He has reproduced many illustrations showing that surgeons during the so-called "Dark Ages" were accustomed to perform many daring operations, and that although their knowledge of anatomy was of necessity limited they seem nevertheless to have operated on the most dangerous areas without fear.

The work of the surgeons of the Renaissance, Paré, Fabricius Hildanus and their contemporaries, is dealt with at length. Special sections describe how surgical science progressed steadily during the seventeenth century. The great discoveries of the nineteenth century—anesthesia, antisepsis, the roentgen ray—bring the history of surgery to its present apogee. Americans will read with interest the author's references to the achievements of their countrymen. Not only do Physick, Valentine, Mott, Gross and others of the historical past receive their mead but some of the living also figure in these pages.

Professor Brunn's book is remarkable for its breadth of view and philosophic tone, hardly to be looked for in a condensed narrative. A most notable feature is the profusion of illustrations and their appropriateness to the text. This is particularly striking in those which are used to illustrate the surgery of the Middle Ages and the period of the Renaissance.

An excellent bibliography is appended to the work. It is greatly to be hoped that an English translation will be made of this book, for it

would be of great value to the advanced student of the history of surgery as well as to the neophyte.

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